(No Model.) 2 Sheets—Sheet 1.

J. H. GUEST.

MANUFACTURE OF INCANDESCENT ELECTRIC LAMPS.

No. 282,884. Patented Aug. 7, 1883.

Fig. 1.

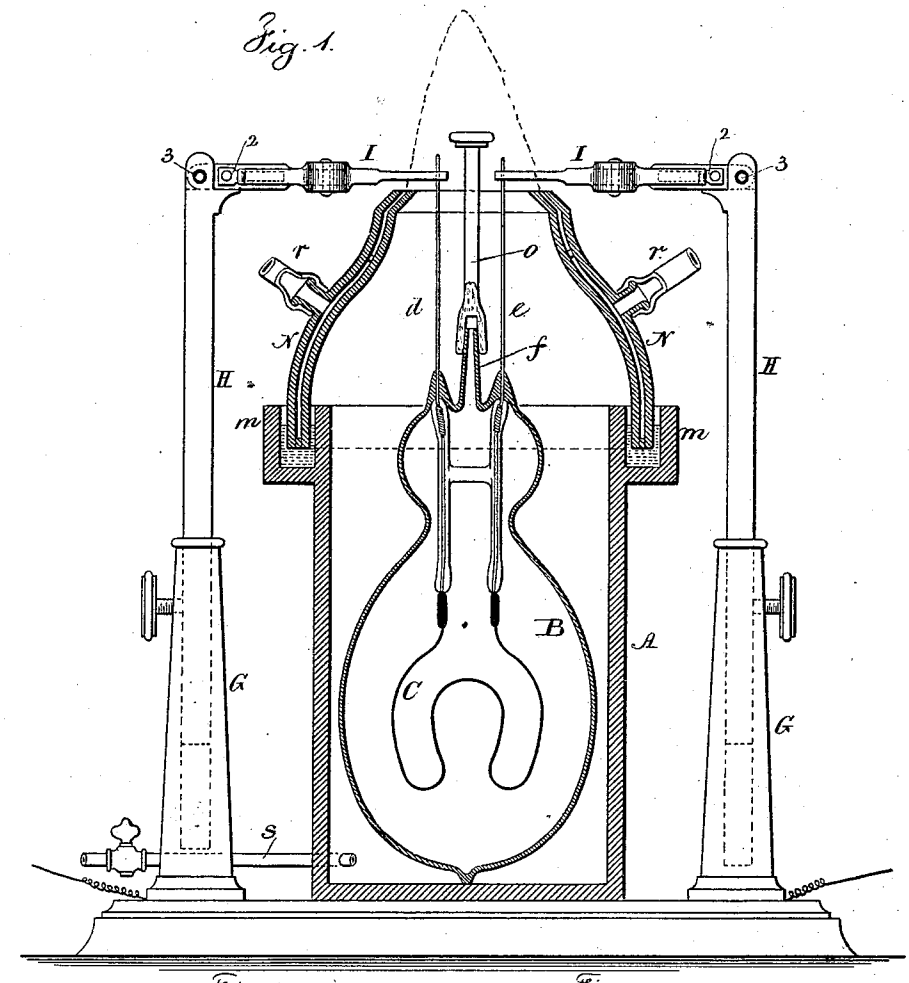


Fig. 5

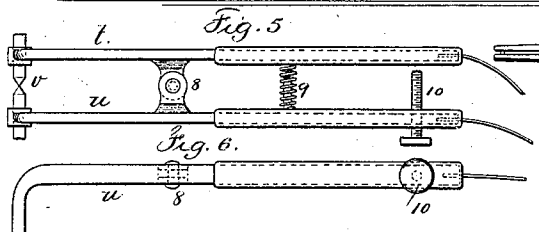


Fig. 4

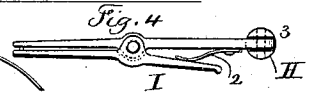
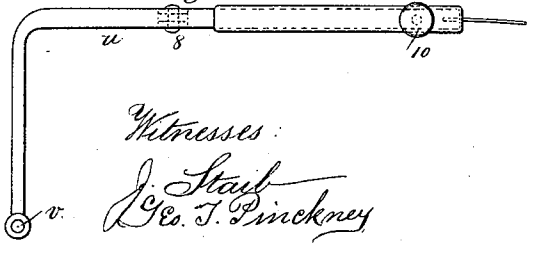


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

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MANUFACTURE OF INCANDESCENT ELECTRIC LAMPS.

No. 282,884. Patented Aug. 7, 1883.

Fig. 2.

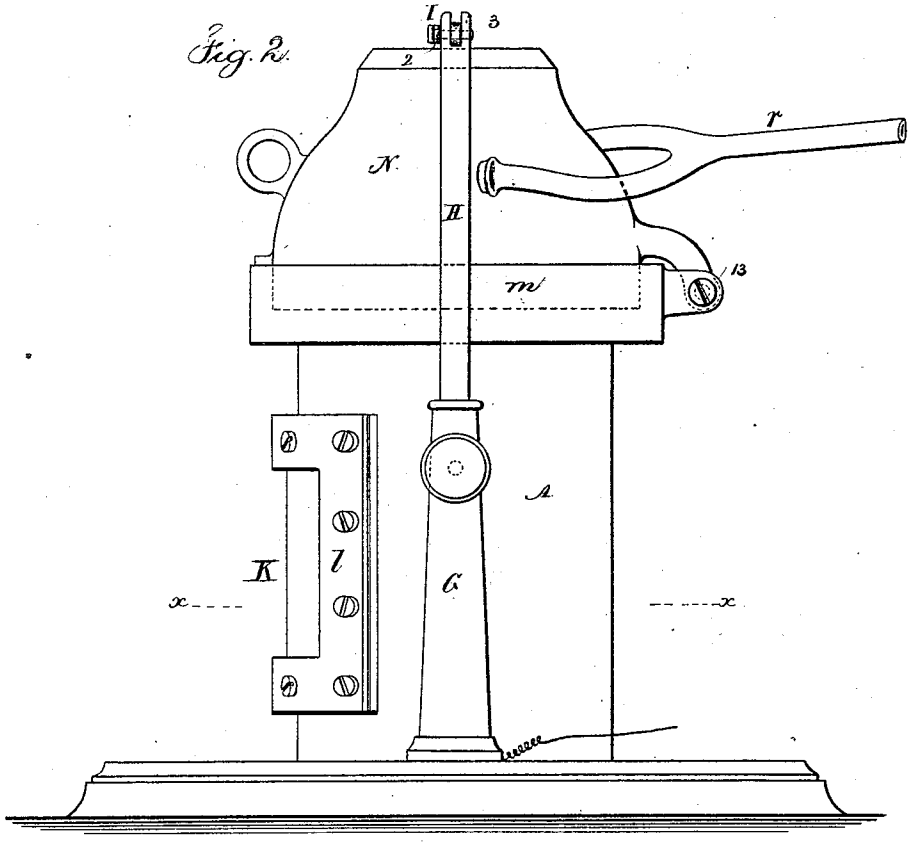
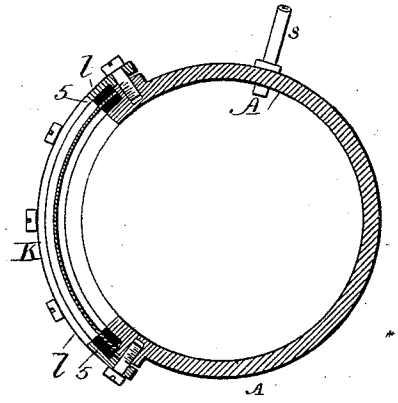


Fig. 3.



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JOHN H. GUEST, OF BROOKLYN, NEW YORK.

MANUFACTURE OF INCANDESCENT ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 282,884, dated August 7, 1883.

Application filed April 30, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN HENRY GUEST, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in the Manufacture of Electric Lamps, of which the following is a specification.

The object of this invention is to effectually exclude the atmospheric air from an electric lamp during the process of finally treating the light-giving body and sealing the glass inclosing-bulb, and to insure the required durability of the light-giving body when put into use, by having the same surrounded in the globe with a rarefied residuum of an inert gas, the whole process being accomplished without employing a vacuum-pump for that purpose.

In Letters Patent No. 256,213, granted to me, I make use of a vessel for treating the filament alone. In the present invention I provide for finally treating the light-giving body after it has been placed in the glass globe or receptacle, and for excluding the atmospheric air from the lamp when the same is being sealed and finished.

In the drawings, Figure 1 is a vertical section of the apparatus and of the lamp. Fig. 2 is a side view. Fig. 3 is a sectional plan at *x x*, Fig. 2. Fig. 4 is a plan of the holder for the electric conductors; and Figs. 5 and 6 represent the electric tongs for fusing the glass in finally sealing the globe.

The vessel A is of suitable size and shape. It is preferably cylindrical, and only large enough to receive freely into it the glass globe B, containing the carbon C to form the incandescent lamp. This lamp is of any desired pattern. I have shown the conductors *d e* as passing through and incased by glass supports, and the globe as provided with the small nipple *f*, which is left open until the lamp is otherwise completed. It is then hermetically sealed.

It is to be understood that the carbon C may be made of a thread, of a piece of paper, or of any suitable material. It is partially carbonized, or sufficiently so to make it a conductor of electricity, and the ends of the carbons are secured to the conductors *d e* by electroplating, or in any other suitable manner.

I provide standards G G, in which are movable slides H H, and at the top there are spring-holders I I for receiving the electric conductors *d e*, and by which the conductors and lamp are suspended within the vessel A. The holders are made as spring-forceps that can be opened by pressure of the fingers, or closed by the action of the springs 2, and there are joints, 3, between the forceps or holders and the slides H, which allow the holders to be swung aside out of the way.

In the side of the vessel A there should be a window, K, of mica or glass, made air-tight by a frame, *l*, and rubber or other packing at 5; or this vessel A may be wholly of glass, and on the top of the vessel there is an annular trough, *m*, to receive the lower edge of the movable cover N. Into this trough water, mercury, or any suitable liquid is placed to form an air-tight seal between the vessel A and cover N. This cover N is preferably hinged at 13 to the vessel A, and it is contracted at the upper end, and there is an annular orifice around the same, through which a gas is supplied, which will burn and form a flame (shown by dotted lines in Fig. 1) rising above the orifice of the cover and excluding the atmosphere effectually from the vessel A and its contents.

Previous to the globe B being inserted into the vessel A the same is by preference filled with a hydrocarbon or non-inflammable gas. This is easily done by a fine tube running up into the globle through the nipple *f*. The gas, being lighter, displaces the air and expels it through the nipple. After this is done the stopper or plug *o* is applied to the nipple to retain the gas, the lamp is placed in the vessel A in the inverted position shown, the cover N is put on, the forceps or holders are turned over, and they grasp and hold the conductors, and by preference the globe is suspended by them. A non-combustible or inert gas—such as carbonic acid—is now by preference turned on, so as to fill the vessel A and the inside of the cover, a pipe, *s*, and cock being provided for this purpose. The burning-gas is now turned on by the pipe *r*, the stopper *o* removed and the gas ignited. The flame as it burns keeps out atmospheric air from the vessel A, and any vacuum action of the flame only serves to lessen the pressure or to remove any traces of air in the vessel A and to replace the same by hydrocarbon gas or carbonic acid or

carbonic oxide or other inert gas. An electric current is now turned onto the lamp, the same, for convenience, passing through the standards G, holders I, and conductors *d e*. The portion of the light-giving body that is the smallest, offering the most resistance, will become the highest in temperature, and upon the same carbon will be deposited from the hydrocarbon gas in the globe, and in this manner the carbon filament will be built up and rendered uniform throughout. This operation can be observed and the temperature gradually increased to the desired extent. When the carbon filament has been perfected, the globe is to be sealed by melting the glass at the nipple by an electric arc, or by suitable heat generated by the electric current, or by any other source—such as an oxyhydrogen flame—while the atmosphere is excluded from around the nipple. The contents of the globe, having been rarefied by the heat, will remain at less than atmospheric pressure.

It will be evident that the carbonic acid or other inert gas in the vessel A around the nipple may be depended upon for excluding atmosphere; but I prefer to use the flame in addition.

I provide two conductors, *t u*, that are hinged together at 8 by an insulating-hinge, and there are carbon or platina electrodes *v*, a spring at 9 to close the electrodes, an insulating-covering to the conductors *t u*, and a stop-screw, 10, to adjust the length of electric arc between the electrodes *v*. The electric current is to be applied to these electric tongs, and they are inserted through the top of the cover N, the tongs being bent, as seen in Fig. 6, so that the handles will not be in the flame. The handles are pressed, the electrodes separated, and a small electric arc is established, in which the glass at the upper end of the nipple *f* is fused to hermetically seal the globe of the lamp, and the operation is completed.

By this improvement the use of a vacuum-pump is rendered unnecessary, and the carbon is finished in the most perfect manner and the atmosphere entirely excluded from the globe.

It will be apparent that the globe can be filled with gas, the light-giving body raised to incandescence, and the gases allowed to expand and pass off, the atmosphere being excluded in any convenient manner, and then the glass nipple melted to hermetically seal the globe.

Any suitable device for connecting the electric conductors to the wires of the lamp may be used, and the electric forceps allow the necessary heat to be applied for melting the glass of the nipple without requiring a flame or risking the admission of atmospheric air.

I claim as my invention—

1. The vessel A and movable cover, in combination with the holders for the conductors of the lamp, and the gas-supply pipes for a flame at the opening in the movable cover, substantially as and for the purposes set forth.

2. The method herein specified of finishing electric lamps, consisting in filling the globe containing the light-giving body with a gas, heating the light-giving body gradually, causing the surplus gas to pass out of the globe, excluding the atmosphere, and then sealing the globe while the light-giving body is incandescent, substantially as set forth.

3. The method herein specified for finishing and sealing electric lamps, consisting in rarefying the gas within the glass globe by the heat of the incandescent conductor, excluding the atmosphere from the opening or nipple of the globe by a flame, and then sealing the lamp by melting the glass of the nipple, substantially as set forth.

4. The combination, with the vessel A, of a movable cover, a liquid seal for the lower edge thereof, an annular burner for gas at the top of the cover, the electric forceps and conductors, substantially as set forth, for finishing and sealing the electric lamp, that is placed within the vessel A, substantially as set forth.

5. In combination with the conductors, the light-giving body and the glass globe containing the same, the holders for the electric conductors, by which the lamp is suspended, and the electric forceps for melting the glass at the nipple of the globe while the filament is in a state of incandescence, substantially as set forth.

6. The method herein specified of sealing electric lamps and excluding atmosphere, consisting in surrounding the nipple or orifice of the glass globe with an inert gas, and melting the glass by an electric arc within such gas, substantially as set forth.

Signed by me this 28th day of April, A. D. 1883.

J. H. GUEST.

Witnesses:
GEO. T. PINCKNEY,
WILLIAM G. MOTT.