(No Model.)

# H. J. MÜLLER.

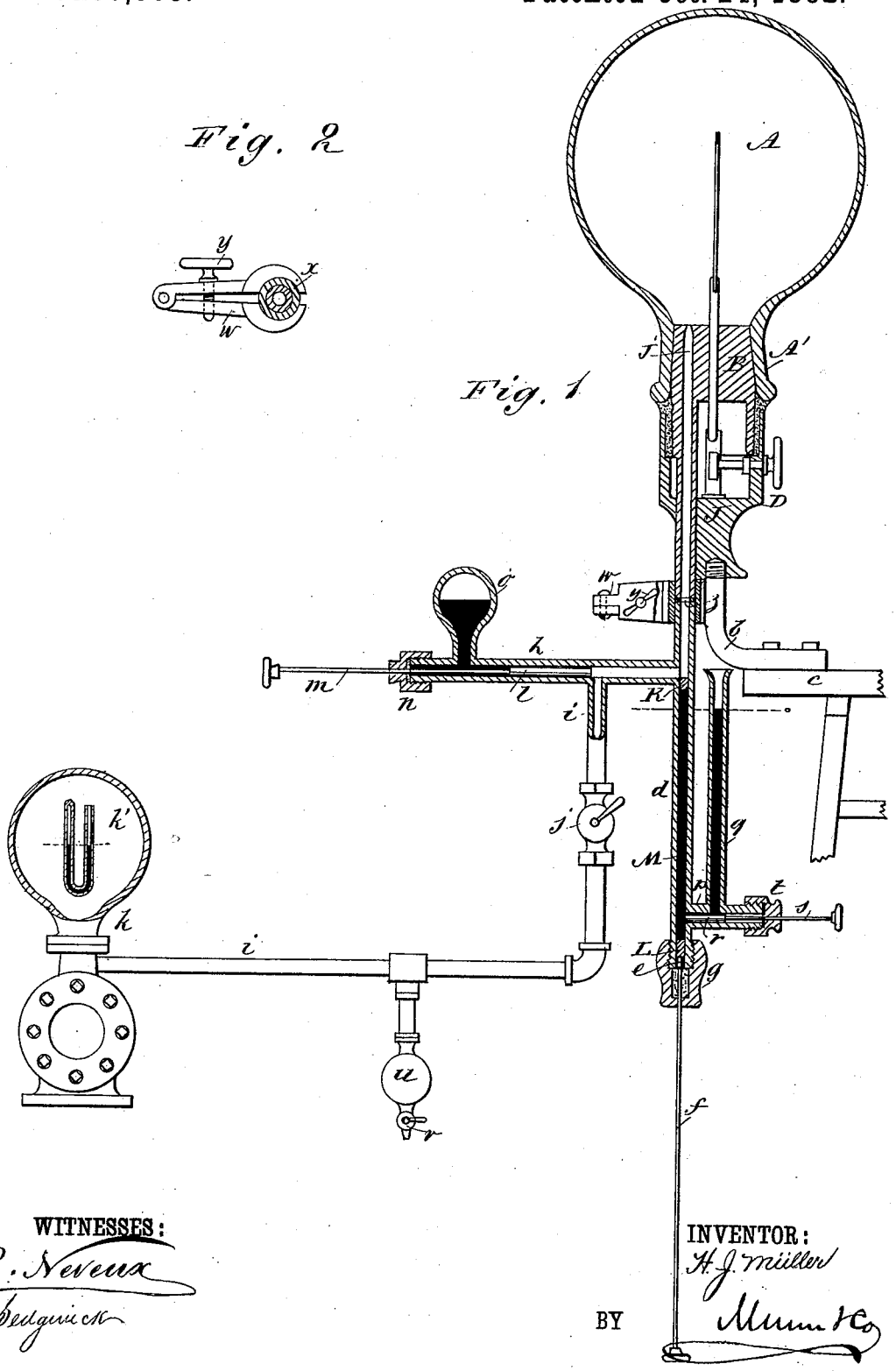
## APPARATUS FOR CREATING VACUUMS IN INCANDESCENT ELECTRIC LAMP GLOBES.

No. 266,303. Patented Oct. 24, 1882.

Fig. 2




Fig. 1

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HANS J. MÜLLER, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND ALEXANDER LEVETT, OF SAME PLACE.

## APPARATUS FOR CREATING VACUUMS IN INCANDESCENT-ELECTRIC-LAMP GLOBES.

SPECIFICATION forming part of Letters Patent No. 266,303, dated October 24, 1882.

Application filed April 11, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, HANS J. MÜLLER, of the city, county, and State of New York, have invented a new and Improved Apparatus for Creating Vacuums in the Globes of Incandescent Electric Lamps, of which the following is a full, clear, and exact description.

The object of my invention is to facilitate creating vacuums in the globes of incandescent electric lamps, and to facilitate sealing these lamps after the vacuum has been produced.

The invention consists in the combination, with an air-pump, of a tube containing a piston and adapted to receive a quantity of mercury, and plugs at the top and bottom of the mercury, which plugs and mercury can be forced into the seal-tube of the lamp after the air has been exhausted, the lower end of this seal-tube being held air-tight on the upper end of the tube containing the plugs and the mercury. The apparatus is provided with a mercury-filling tube combined with a sliding piston for opening and closing it, and with a branch tube containing a piston for opening and closing the end of the tube leading to the air-pump. This tube is provided with a receptacle for collecting the mercury which accidentally passes into the air-tube.

The invention also consists in the arrangement and combination of parts, as will be fully set forth hereinafter.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in both the figures.

Figure 1 is a longitudinal sectional elevation of my apparatus for creating vacuums in incandescent electric lamps. Fig. 2 is a plan view of the clamp for holding the seal-tube of the lamp in the apparatus.

The plug B fits into the neck A′ of a bulb or globe, A, and is attached to a base, D. A seal-tube, J J′, which is contracted at the upper end, projects from the bottom of the plug B through the base D, all as has been fully described in the specification of this lamp in another application. A bent arm, *b*, having its upper end screw-threaded, is attached to a table or frame, *c*, and on this arm *b* the base D of the lamp is screwed, as shown. A vertical glass tube, *d*, of precisely the same inner diameter as the tube J of the lamp, contains a piston, *e*, attached to the piston-rod *f*, passing through a stuffing-box, *g*, screwed on the lower end of the tube *d*. A horizontal tube, *h*, branches off from the tube *d*, near its upper end, and from this tube *h* a tube, *i*, provided with a cock, *j*, branches off and leads to an air-pump, *k*, of some suitable construction, which pump is provided with a gage, *k′*. The tube *h* contains a piston, *l*, slightly longer than the distance in the tube *h* from the tube *i* to the tube *d*, which piston is attached to a piston-rod, *m*, passing through a stuffing-box, *n*, on the outer end of the tube *h*. A mercury-receptacle, *o*, in communication with the tube *h*, is secured on the top of the same. A horizontal tube, *p*, branches off from the tube *d*, near the lower end of the same, and from this tube *p* a tube, *q*, open at the upper end, extends upward. The tube *p* contains a piston, *r*, slightly longer than the distance from the tube *d* to the tube *q*, which piston *r* is attached to a piston-rod, *s*, passing through a stuffing-box, *t*, on the end of the tube *p*.

A receptacle, *u*, provided at the bottom with a cock, *v*, is suspended from the lowest part of the tube *i*. A clamp, *w*, having the ends of the jaws curved, and provided with rubber packing *x*, is provided with a clamping-screw, *y*. The ends of the jaws of this clamp are curved in such a manner as to fit closely against the tubes *d* and J. The length of the tube *d* from its inner bottom surface to the inner bottom surface of the tube *h* must be exactly equal to the length of the aperture J′ in the tube J and plug B.

The tubes *d* and *q* are provided with zero-marks on the same level, the distance from this zero-mark to the lower edge of the plug K being exactly equal to the distance from the right-hand edge of the opening of the tube *d* to the left-hand edge of the opening of the tube *q*.

The operation is as follows: The lamp is screwed on the arm *b*, and the lower end of the tube J is placed on the upper end of the tube *d* and packing material *z* is placed between the meeting ends of the tubes, which are held to-

gether by the clamp *w*, as shown. Before uniting the tubes a plug, L, of gutta-percha or rubber, is pushed to the bottom of the tube *d*, and a like plug, K, is pressed into the tube *d* until its upper edge is flush with the lower edge of the aperture of the tube *h*, as shown. The piston *r* is drawn outward until the lower end of the tube *q* is open, and mercury is poured into the tube *q* until it is on the level of the zero-marks. The piston *r* is then pushed back and forces the mercury in the tube *p* into the tube *d*, causing the mercury in the tube *d* to rise up to the bottom of the plug K. The piston *l* in the tube *h* is then withdrawn until the upper end of the tube *i* is open. Then the pump *k* is operated to exhaust the air from the globe A until the gage in the pump *k* shows zero. Then the piston *l* is pushed forward until its end is flush with the side of the aperture of the tube *d*, to prevent the escape of mercury into the tube *h*. The piston-rod *f* is then pushed upward, whereby the plugs K and L and the mercury M in the tube *d* will be forced into the tube J, the plug K being pressed into the upper contracted end of the aperture J′. These plugs K and L and the mercury effectually seal the lamp and prevent the access of air. The lamp is then unscrewed from the bracket-arm *b*, and another lamp, which is to be exhausted, is screwed on this arm. The mercury which accidentally passes into the tubes *h* and *i* is collected in the receptacle *u*, and can be drawn off at proper intervals by opening the cock *v*. The mercury in the receptacle *o* forms a close joint for the piston and rod in the tube *h*. Any number of the above-described apparatus can be combined with one air-pump.

It is obvious the invention may be used with equal facility for exhausting other vessels than lamp-globes—as, for instance, jars for containing fruit or other edible substances.

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

1. An apparatus for creating a vacuum, made substantially as herein shown and described, with a tube for containing mercury, and plugs below and above the mercury, and with devices for forcing the plugs and the mercury into the seal-tube of a lamp, which seal-tube is to be held on the end of a tube containing the plugs and the mercury, as set forth.

2. In an apparatus for creating a vacuum, the combination, with an air-pump, and a tube which communicates with the lamp-bulb, and a suitable device for cutting off communication with the pump after the air has been exhausted, of a piston, *e*, having rod *f*, for use in forcing a suitable seal into the said lamp-tube, substantially as shown and described.

3. In an apparatus for creating a vacuum, the combination, with an air-pump and a tube communicating with the lamp-tube, of the branch tube *h*, the piston *l* therein, the piston *e*, having rod *f*, and the seal consisting of mercury-column M and plugs K L, as shown and described.

4. In an apparatus for creating a vacuum, the combination, with the air-pump and the tube J, which communicates with the lamp-chamber, the tube *h*, and piston *l*, working in the latter, of the mercury receptacle or bulb O, connected with tube *h* in rear of said piston, to operate as specified.

5. In an apparatus for creating a vacuum, the combination, with the tube *d*, the piston *e*, the piston-rod *f*, and the branch tube *p*, of the mercury-feeding vertical tube *q*, the piston *r*, and the piston-rod *s*, substantially as herein shown and described, and for the purpose set forth.

6. In an apparatus for creating a vacuum, the combination of an air-pump, the tube *d*, containing a column of mercury, the piston *e*, the piston-rod *f*, the tube *h*, containing mercury, and the piston *l*, with rod *m*, the tube *i*, leading to the air-pump, and the mercury-collecting receptacle *u*, suspended from the pipe *i*, substantially as herein shown and described, and for the purpose set forth.

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Witnesses:
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