(No Model.)

J. W. PACKARD.

MANUFACTURE OF INCANDESCENT LAMP FILAMENTS.

No. 391,815. Patented Oct. 30, 1888.

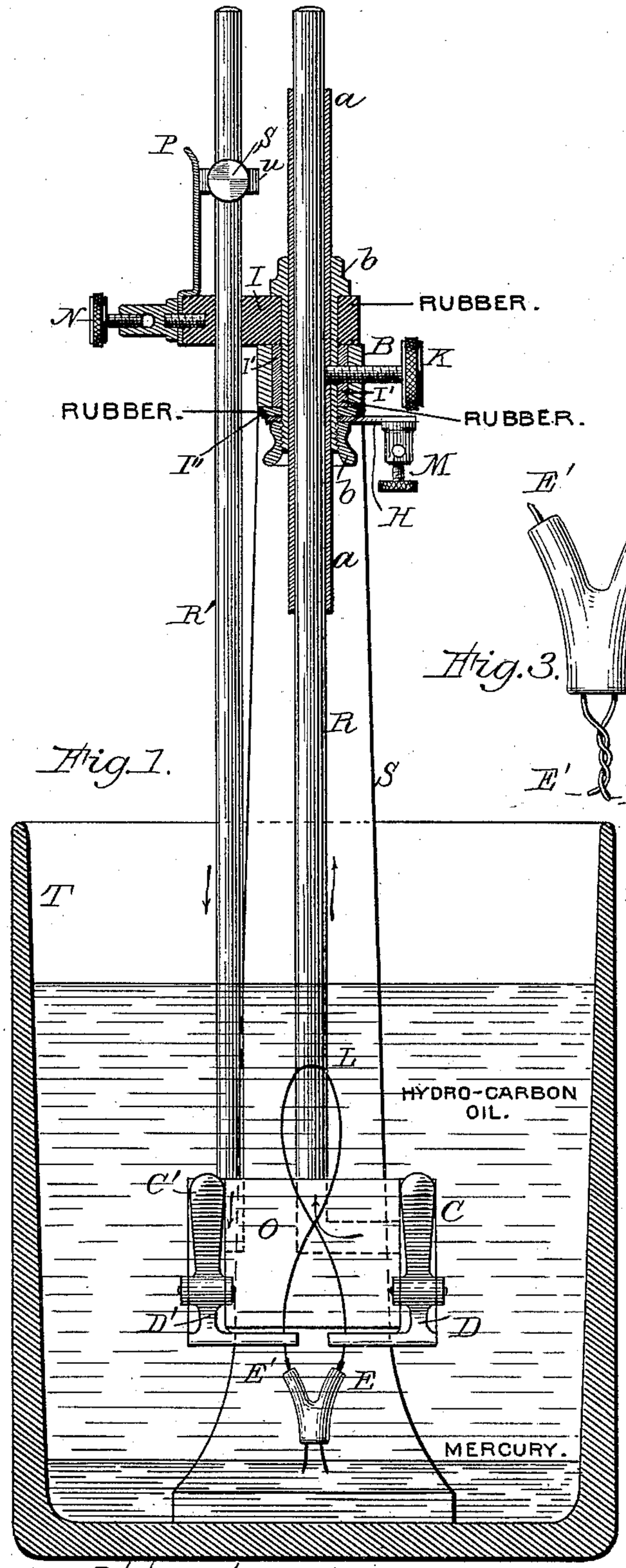

Fig. 1.

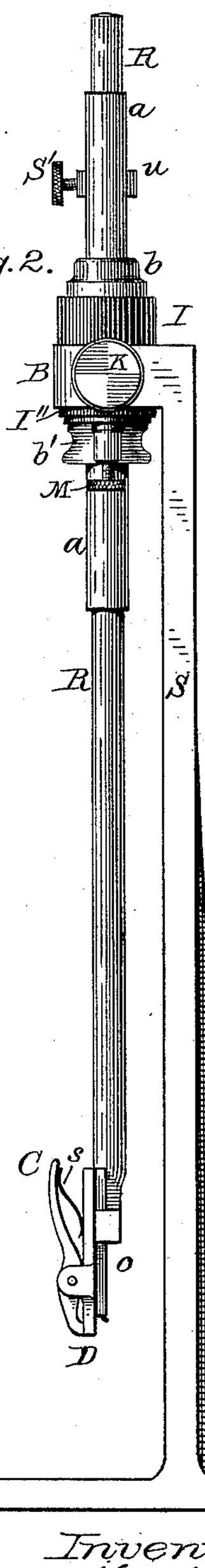

Fig. 3.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF INCANDESCENT-LAMP FILAMENTS.

SPECIFICATION forming part of Letters Patent No. 391,815, dated October 30, 1888.

Application filed April 6, 1888. Serial No. 269,811. (No specimens.)

To all whom it may concern:

Be it known that I, JAMES WARD PACKARD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Methods of Incandescent-Electric-Lamp Manufacture; 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.

My invention relates to a certain method employed in the manufacture of incandescent electric lamps, hereinafter to be described and claimed.

In the drawings, Figure 1 shows a front view and partial section of the preferred form of apparatus by which my method may be applied. Fig. 2 is a side view of the same, the tank being removed. Fig. 3 illustrates a modification.

In the manufacture of incandescent electric lamps it is customary to fuse or cement the carbon strip therein used to the platinum electrodes of the lamp by immersing the said carbon strip and electrodes in a suitable solution of carbon—such as hydrocarbon oil—and passing the electric current through the carbon strip and the platinum electrodes. A deposition of carbon at the joint is thereby produced and the connection between the electrodes and the ends of the carbon strip made complete and permanent. It is evident that for many reasons it is not desirable to have any considerable portion of the current pass through the entire loop formed by the carbon strip. To avoid this it has been customary to place a bar of some conductive material of low resistance across the loop near where the ends of the carbon strip join the electrodes. In cases where a carbon strip of small cross-section—such as those used in the manufacture of high-resistance lamps—is being operated upon, it frequently bends and breaks under the weight of the short circuiting-bar. To avoid the above-mentioned difficulty, the method described in Patent No. 353,158, granted to A. L. Reinmann, November 23, 1886, was devised. While this avoids the difficulty, it is less effective than the original method, because the fusing or cementing current does not pass through the ends of the carbon strip which are to be cemented to the electrode. To avoid both the objections to the above-described methods, I have devised that hereinafter to be described.

In the preferred form of apparatus by which my method may be applied, (illustrated in the accompanying drawings,) T is a tank containing hydrocarbon oil, and also a certain quantity of mercury, as clearly shown in Fig. 1.

S is a standard having the bracket B.

O is a block of insulating material, to which the clamps, of any suitable conducting material, and the rods R R′, also of conducting material, are attached. The clamps, as clearly shown in Figs. 1 and 2, consist of the parts D D′, attached to the block O and connected, respectively, by suitable conducting-strips with the rods R R′, together with the hinged parts C C′, controlled by the springs *s s′*. Within the bracket B is the collar I′, of rubber or other suitable insulating material. The parts I and I′, also of insulating material, completely insulate the sleeve *a* and the parts *b b′*, surrounding the rod R, from the bracket B. The parts *a b b′* are all of conducting material, and being in contact with the bracket H, supporting the binding-post N, they afford electric connection from the said binding-post to and through the rod R to the clamp C. Upon the bracket is supported the binding-post *n* and the spring contact-piece P. When the metallic collar U, which is adjustably held upon the rod R′ by the set-screw S′, comes in contact with the spring-piece P, metallic connection is complete between the binding-post N and the clamp C′. The carbon strip formed into a loop, L, has one of its ends held by the clamp C, the other by the clamp C′. The platinum electrodes E E′ are attached mechanically to the ends of the carbon strip, as indicated in Fig. 1.

The operation of my method is the following: The carbon strip L is held by the clamps C C′ as close as possible to the ends which are to be cemented to the electrodes E E′. The clamp-holding frame, consisting of the rods R R′ and the insulating block O, is then pushed downward through its bearings in the insulating-standard S until the lower extremities of the platinum electrodes touch the mercury at the bottom of the tank. The collar U is so ad-

justed upon the rod R′ that simultaneously with the immersion of the ends of the electrodes in the mercury it touches the spring-contact-piece P. Consequently the current derived from any suitable external source of electricity enters through the binding-post N, passes through the rod R′, as indicated by the arrow, through the clamp C′, through a small portion of the carbon strip at one of its extremities, through the platinum electrode E′, the mercury, the other electrode, E, and out through a small portion of the carbon strip at its other extremity by way of the clamp C, the rod R, its surrounding sleeve and bracket H, to the binding-post N. By this method of causing the current to enter the carbon strip near one extremity and pass by way of the low-resistance circuit, composed of the platinum electrodes and the mercury bath, out through the other extremity of the loop, the fusing or cementing current (constituting by far the greater part of the original current) passes directly through the ends of the carbon loop and the ends of the platinum electrodes, which are to be cemented together. Thus is produced that intimate contact between the particles composing the two surfaces which is necessary to produce the best joint. While thus the advantages inherent in the common method described at the opening of this specification are secured, the carbon loop is free from any weight which might break or bend it, and so the advantages of the Reinmann method are also obtained. It is evident that while the greater part of the current supplied by the external circuit follows the path above traced out, a small portion of the said current, which I will call the "cleansing current," is forced through the carbon loop and is just sufficient to heat it to the point of cleansing it from all moisture, grease, and other impurities without altering its electrical resistance.

If desirable, the mercury shown in Fig. 1 may be dispensed with and the platinum electrodes E E′ short-circuited by twisting them together, as shown in Fig. 3, or by any other method desired. This, or some equivalent method of short-circuiting by a rigid metallic contact, is preferable on the score of safety, since there is then no possibility of failure, such as would occur if the mercury should escape from the apparatus shown in Fig. 1.

Another advantage of my method is that the circuit is not completed for the passage of the electric current until the electrodes are short-circuited by their immersion in the mercury, and consequently all danger of igniting the hydrocarbon vapor by the incandescence of the strip of carbon, which might occur should the entire current be forced through it before immersion in the oil, is avoided.

No claim is here made to the apparatus herein described. Such apparatus will be claimed in a separate application filed by me of even date herewith.

Having therefore described my invention, both in essence and detail, what I claim as new, and desire to protect by Letters Patent, is—

The method of cementing suitable electrodes to the carbon strips used in the manufacture of incandescent electric lamps, and at the same time of cleansing the carbon strips, which consists, first, in immersing the carbon strip, the ends of which are held in contact with the ends of the short-circuit electrodes, in a hydrocarbon oil; second, in connecting one wire of an electric circuit with the carbon strip at a point near one of its extremities, while the other wire is connected to the carbon strip at a point near its other extremity, and then passing a current through the circuit, whereby the greater portion of the current so conducted by the said circuit is passed through the extremities of the carbon strip and the short-circuited electrodes, while a less portion is shunted through the high resistance offered by the loop of the carbon strip, substantially as described.

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

JAMES WARD PACKARD.

Witnesses:

A. P. SMITH,

JOHN J. ENNIS.