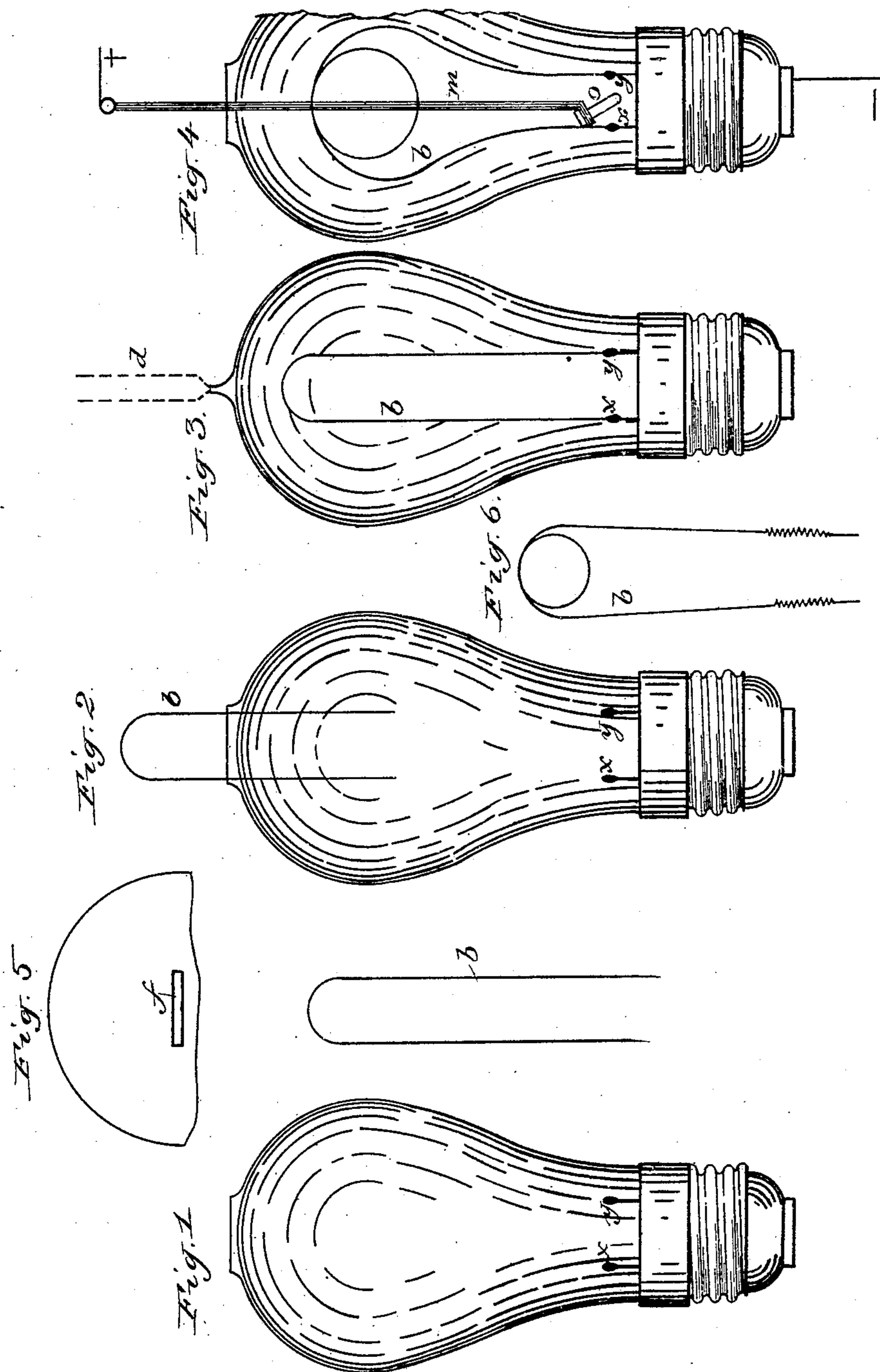


(No Model.)

J. MÖHRLE.  
REPAIRING INCANDESCENT LAMPS.

No. 541,491.

Patented June 25, 1895.



Witnesses:  
M. C. Massie.  
J. F. Beale.

Inventor:  
Joseph Möhrle  
by Max Georgi  
his attorney.

# UNITED STATES PATENT OFFICE.

JOSEPH MÖHRLE, OF MUNICH, GERMANY.

## REPAIRING INCANDESCENT LAMPS.

SPECIFICATION forming part of Letters Patent No. 541,491, dated June 25, 1895.

Application filed January 25, 1895. Serial No. 536,262. (No model.) Patented in Germany October 3, 1890, No. 58,802; in England October 18, 1890, No. 16,613; in France October 20, 1890, No. 208,976, and February 17, 1892, No. 225,731; in Belgium June 2, 1891, No. 95,085; in Sweden November 3, 1891, No. 4,011; in Switzerland November 4, 1891, No. 4,243; in Spain November 23, 1891, No. 2,479 and No. 12,647; in Denmark February 3, 1892, No. 588/91; in Austria-Hungary March 1, 1892, No. 51,994 and No. 4,471, and in Italy March 31, 1892, No. 31,114.

*To all whom it may concern:*

Be it known that I, JOSEPH MÖHRLE, a citizen of the Kingdom of Bavaria, and a resident of Munich, Bavaria, Germany, have invented certain new and useful Improvements in Repairing Incandescent Lamps, (for which I have received patents in the following countries: Germany, No. 58,802, dated October 3, 1890; Austria-Hungary, No. 51,994 and No. 4,471, dated March 1, 1892; Belgium, No. 95,085, dated June 2, 1891; Great Britain, No. 16,613, dated October 18, 1890; Denmark, No. 588/91, dated February 3, 1892; Sweden, No. 4,011, dated November 3, 1891; Spain, Nos. 2,479 and 12,647, dated November 23, 1891; Switzerland, No. 4,243, dated November 4, 1891; Italy, No. 31,114, dated March 31, 1892; France, No. 208,976, dated October 20, 1890, and No. 225,731, dated February 17, 1892,) of which the following is a specification.

My invention relates to an improved process of and device for inserting new filaments in incandescent lamps.

The object of my invention is to restore incandescent lamps in which the filaments have been burned out or broken, whereby the lamp becomes as efficient as before.

My invention consists in a process for inserting and securing the new filament in place.

The invention will first be described in connection with the accompanying drawings and then particularly pointed out in the claims.

In the drawings, Figure 1 shows a lamp with a slot formed in the top and with the filament removed, a new filament being shown beside it. Fig. 2 shows the manner of inserting the new filament through the slot. Fig. 3 shows a lamp with the new filament in place and ready to be exhausted, a pipette being shown in dotted lines. Fig. 4 illustrates the new device employed by me in welding the filament to the electrodes. Fig. 5 is a plan view of a lamp, showing the slot for the insertion of the filament. Fig. 6 illustrates another form of filament.

In my process, the point of the glass globe is first removed so that only a very small

opening is formed. Then a slot, *f*, somewhat enlarged in the middle, as indicated in Fig. 5, is formed with the aid of a blow-pipe flame, *i. e.*, the small opening is enlarged to form a slot whose rim extends upward, according to Figs. 1 and 3. The old filament is then removed and the two platinum-electrodes, *x, y*, are cleaned. When this is completed, the new filament, *b*, of any form or system whatever, is introduced through the slotted opening, *f*.

The attachment of the bent filament is effected by connecting its ends to the platinum-electrodes by a plastic mass. This plastic mass is prepared from pure carbon or hard pure vegetable charcoal and a solution of salts of metals fusing with difficulty. The solutions, for example, are saturated solutions of platinum or copper in acids.

The preparation of the carbon to be employed for the plastic mass is carried on in the known manner, *e. g.*, by forming electric arcs in benzol or other liquid hydrocarbon, the two electrodes being slowly separated, and pure carbon being then deposited upon one of the electrodes. Of course, the carbon will be obtained in this manner, when no pure vegetable charcoal is at hand. A small portion of the mass so prepared from carbon in the solution of a metallic salt is applied to the slightly bent electrodes and the filament pressed against the same. When the mass has hardened somewhat and the filament is in proper position, an additional quantity of the mass is applied until the filament is completely enveloped and the electrodes do not project beyond the same. The lamp is then dried. After this operation, the mass is rendered conducting, so as to offer no resistance to the passage of the current. This is effected as follows: Fig. 4 represents a simple contrivance which consists in a piece of copper wire, *m*, coated with an insulating substance, so that its contact with the filament will not render the same inoperative. At its upper end, the copper wire is connected with the circuit, while at its lower end it is provided with a small piece of carbon, preferably in the shape

of a cylinder, *o*. To make the cementing mass conducting, this small cylinder is introduced into the lamp through the slot, as indicated in the drawings. A suitable electric current 5 being now passed through the copper wire and the electrode touched with the small carbon cylinder, a small electric arc is generated, which brings the mass to red incandescence. A passage for the current is thus established, 10 and made apparent by introducing an incandescent lamp into the circuit. The same manipulation is performed with respect to the other electrode.

One of the essential features of my process 15 consists in the employment of the above-described carbon cylinder as an anode, while the electrode to which the filament is being attached forms the cathode. In this way, the plastic mass is heated to incandescence, and, 20 at the same time, the electric current carries away small particles of carbon from the anode and deposits them upon the joint, thereby building up the same and greatly strengthening it. After the filament has thus been at- 25 tached, the slot, *f*, in the lamp, is brought opposite the flame, the slot closed and the exhaust pipe or pipette, *d*, applied. The air is then exhausted and the lamp sealed in the well known manner.

30 Fig. 3 represents the new lamp which even an expert can not distinguish from the usual lamp.

In suitable lamps, the connection of the ends of the filaments with the electrodes may 35 be carried out by means of thin platinum sleeves in the shape of tubes or helical wires

of proper cross section, as shown in Fig. 6, which are secured by cement, as above. This mode of connecting the filaments with the electrodes is very secure. 40

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

1. The process of restoring incandescent lamps, which consists in forming an opening 45 in the glass globe, then removing the old filament, then cleaning the electrodes and applying to them a cement comprising a mixture of carbon and a solution of a metal salt, then inserting a new filament into the cement 50 on the electrodes, then drying the cement, then applying more cement, and finally fusing the cement by a current of electricity, substantially as set forth.

2. The process of restoring incandescent 55 lamps, which consists in forming an opening in the glass globe, then removing the old filament, then cleaning the electrodes and applying to them a cement comprising a mixture of carbon and a solution of a metal salt, then 60 inserting a new filament into the cement on the electrodes, then drying the cement, then applying more cement, and then forming an electric arc between the mass of cement and a carbon anode, substantially as set forth. 65

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

J. MÖHRLE.

Witnesses:

ALBERT WEICKMAN,  
CARL MAYOR.