

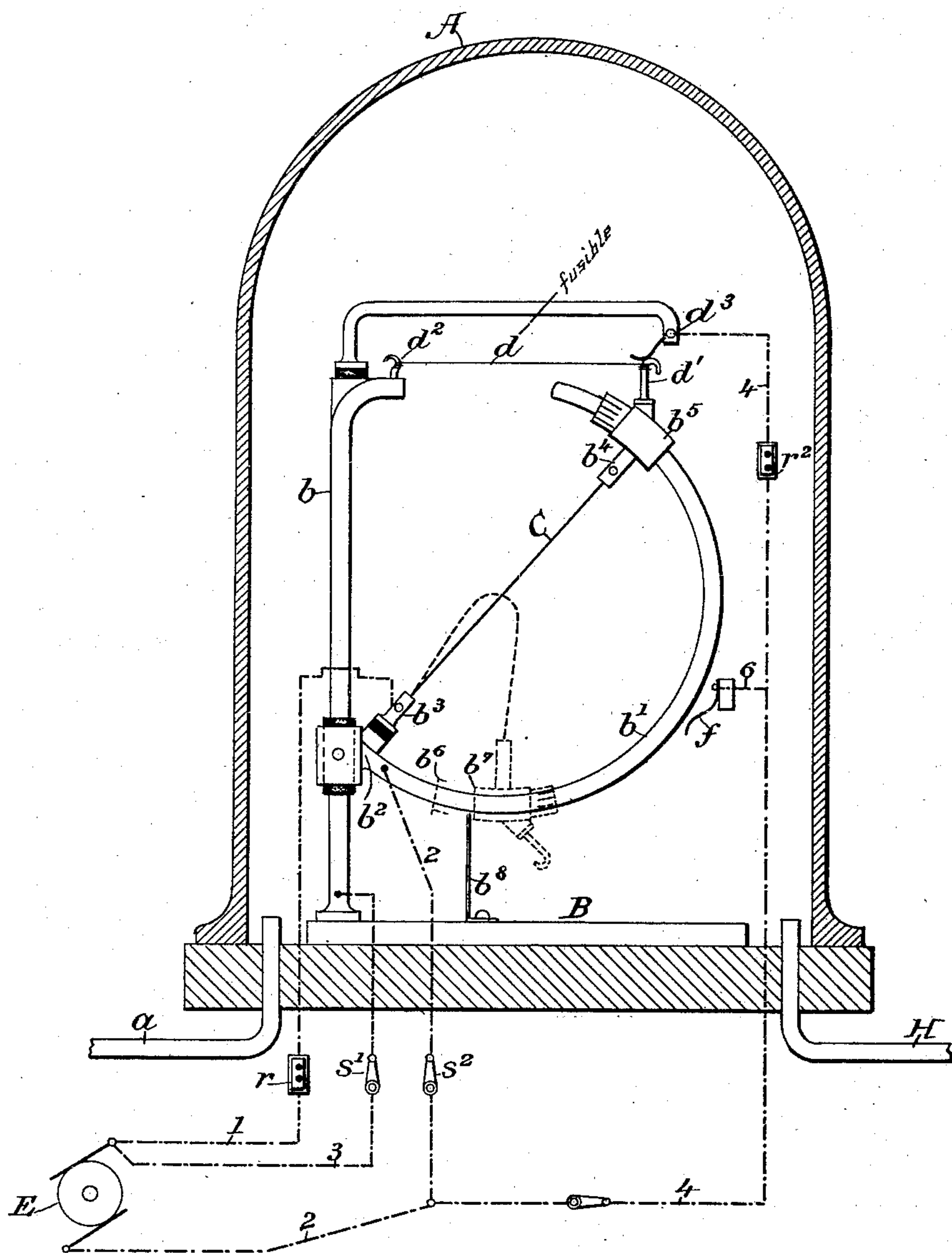
(No Model.)

E. P. THOMPSON.

# PROCESS OF BENDING FILAMENTS FOR INCANDESCENT ELECTRIC LAMPS.

No. 371,000.

Patented Oct. 4, 1887.



ATTEST:

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# UNITED STATES PATENT OFFICE.

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PROCESS OF BENDING FILAMENTS FOR INCANDESCENT ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 371,000, dated October 4, 1887.

Application filed January 22, 1887. Serial No. 225,121. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD P. THOMPSON, a citizen of the United States, residing in Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Processes of Bending Filaments for Incandescent Electric Lamps, of which the following is a specification.

The invention relates to the method of forming looped filaments for incandescent electric lamps from straight carbonized filaments, and to the process of treating the same with hydrocarbon compounds.

In practice it is found advantageous to employ in incandescent electric lamps looped carbon, in distinction from straight carbon filaments; but in some instances it is more convenient to carbonize them in a straight form and afterward bend them. The object of the present invention is to provide convenient and reliable means for bending a straight filament into the required shape while it is incandescent, and in providing means for treating the filament both before it is bent and while it is being bent, and, if desired, after it has been bent; and also in producing a permanent set of the molecules, if desired, by breaking it while incandescent at any desired point in its flexure.

The invention consists, in general terms, in supporting one end of a straight filament in a fixed clamp and the other end in a clamp moving in the arc of a circle, and in providing means for releasing the movable clamp and causing it to approach the fixed clamp while the filament is incandescent. Other means are provided for supplying a gas of hydrocarbon or other carbon compound to the filament, and for sending a current of increased strength through the filament at any desired point in its flexure, thereby breaking it and producing a permanent set of the molecules. This latter method is adopted when it is desired to produce a permanent set of the molecules while the filament is in any desired form, and it may be repeated by bending the filament a slight degree, then breaking it and treating it, and afterward bending it in the same manner still farther.

In the accompanying drawing there is illus-

trated an apparatus adapted to carry out the invention.

Referring to the figure, A represents a suitable bell-jar or other containing-vessel, from which the air may be exhausted through a suitable tube, *a*. Within this jar there is placed a standard, B, provided with an arm, *b*, upon which there is supported an arc, *b'*. The fixed end *b*<sup>2</sup> is designed to receive one end of the straight carbon filament C. The other end of the filament is designed to be held by a clamp, *b*<sup>4</sup>, carried upon a movable block, *b*<sup>5</sup>, which is adapted to move along the arc *b'*. When the filament is placed in position, the block *b*<sup>5</sup> is held near the upper end of the arc *b'* by means of a thin wire or conductor, *d*, preferably of German silver, or other metal which may be fused, when desired, by a strong current of electricity. This conductor *d* extends from a projection, *d'*, upon the block *b* to a suitable point or hook, *d*<sup>2</sup>, upon the upper end of the support *b*. When the block *b*<sup>5</sup> is released by breaking the conductor *d*, it will move along the arc *b'* by the force of gravity, carrying with it the corresponding end of the filament C. The position of the arc is such that when the block *b*<sup>5</sup> is at its lowest point it will hold the two ends of the filament at the proper distance apart. The block in falling will naturally tend to pass somewhat beyond this point, as indicated by the dotted lines *b*<sup>6</sup>, but will return to the position shown by the dotted lines *b*<sup>7</sup>. If desired, a spring, *b*<sup>8</sup>, may be employed as a buffer for breaking the movement of the block *b*<sup>5</sup>.

It is designed that the filament shall be incandescent when it is thus bent by the movement of the block *b*<sup>5</sup>, for this reason: one pole of a suitable generator or other source of electricity, E, is connected by conductor 1, through an adjustable resistance, *r*, with the insulated clamp *b*<sup>3</sup>. The other pole of the generator is connected by the conductor 2 with the arc *b'*, and this with the clamp *b*<sup>4</sup>, thus placing the filament in circuit.

For the purpose of heating the wire *d*, and fusing it when desired, one pole of the generator E is connected by a conductor, 3, with the standard *b* through a switch, *s'*. By closing the switch *s'* the circuit may thus be com-



pleted through this standard, the conductor  $d$ , and the arc  $b'$ . The current thus sent will fuse the conductor  $d$  while the filament is incandescent, and the block  $b^5$  will thus be released.

It may be desired to break the filament while it is thus heated, and for this purpose a contact-brush,  $f$ , adjustable along the circle of the arc  $b'$ , is employed for sending a current of sufficient strength through the filament the moment the block  $b^5$  reaches the point at which the brush  $f$  is placed. It is designed that the block  $b^5$  shall in this instance be released by fusing the conductor  $d$  by a current from one pole of the generator through the conductor 3, the wire  $d$ , a conductor, 4, leading to a contact-point,  $d^3$ , which touches the point  $d'$  when the block  $b^5$  is in its upward position. The conductor 4 is connected, through a suitable resistance,  $r^2$ , with the conductor 2, and thus with the corresponding pole of the generator. A current through this conductor will thus fuse the conductor  $d$  and release the block  $b^5$ . When it is opposite the brush  $f$ , a strong current is transmitted to the filament C through the conductors 4 and 6, the switch  $s^2$  being opened, and through the conductor 1 back to the other pole of the generator. This will cause the filament to break in whatever position it is when the circuit is thus completed. This operation may be repeated, if desired, gradually bending the filament into the shape which it is ultimately to assume.

The filament may be charged and treated with a hydrocarbon compound, if desired, by introducing it through a tube, H, and heating it while in any desired position.

I claim as my invention—

1. The hereinbefore-described method of treating filaments, which consists in bending the filament, transmitting a current of electricity of abnormal strength therethrough when in any desired position, thereby breaking the same and giving a permanent set to its molecules.

2. The hereinbefore-described method of treating filaments, which consists in bending the filament, transmitting a current of elec-

tricity of abnormal strength therethrough when in any desired position, thereby breaking the same, giving a permanent set to its molecules, and repeating the same operation.

3. The hereinbefore-described method of treating filaments, which consists in bending the filament, transmitting a current of electricity of abnormal strength therethrough when in any desired position, thereby breaking the same and giving a permanent set to its molecules, and in alternately treating the filament with a hydrocarbon gas or vapor.

4. In an apparatus for treating carbons, a stationary clamp, a curved arm, a clamp movable thereon toward and from the stationary clamp, and means for releasing said movable clamp.

5. In an apparatus for treating carbonized filaments and bending the same, a curved arm or support, a stationary clamp at one end, a clamp movable along said arm, a fusible releasing device for said movable clamp, and means for transmitting a current of electricity through said releasing device, substantially as described.

6. In an apparatus for bending carbonized filaments, a curved arm in the form of an arc of a circle, a stationary clamp at one end for receiving one end of the filament, a clamp movable upon the arm for receiving the other end of the filament, said clamps being insulated from each other, means for transmitting a current of electricity through the filament, and means for releasing the movable clamp at will, allowing it to approach the stationary clamp, substantially as described.

7. The hereinbefore-described method of treating filaments, which consists in bending the same and in breaking the filament while bent and under flexuous strain by means of heat, substantially as described.

In testimony whereof I have hereunto subscribed my name this 19th day of January, A. D. 1887.

EDWARD P. THOMPSON.

Witnesses:

DANL. W. EDGECOMB,  
CHARLES A. TERRY.