

(No Model.)

E. P. THOMPSON.

METHOD OF CARBONIZING FILAMENTS FOR INCANDESCENT  
ELECTRIC LAMPS.

No. 331,663.

Patented Dec. 1, 1885.

Fig. 1,

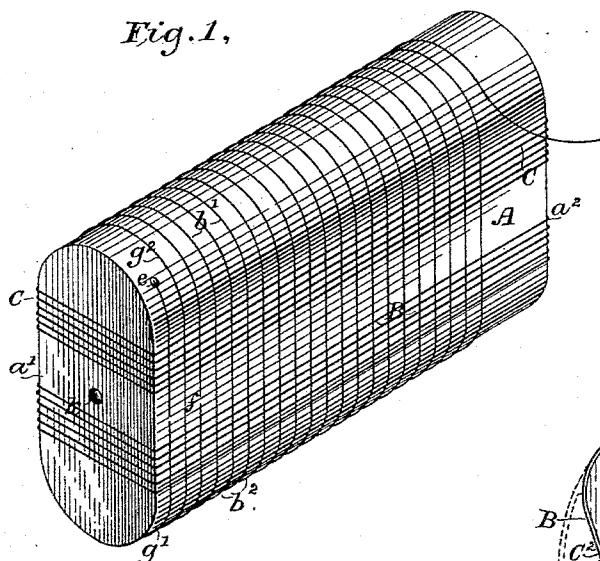


Fig. 3.

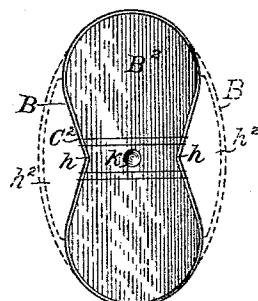


Fig. 2,

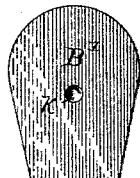
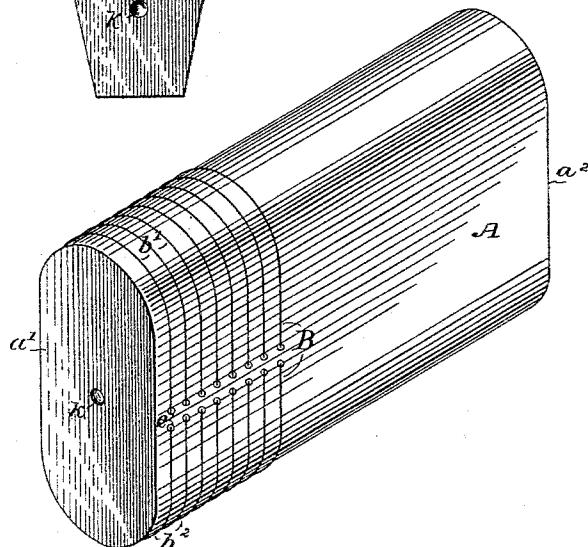


Fig. 4,



Witnesses

W<sup>m</sup> A. Shink<sup>b</sup>  
Jos<sup>t</sup> S. Palmer

By his Attorneys

Pope Edgecomb & Butler

Inventor

Edward P. Thompson

# UNITED STATES PATENT OFFICE.

EDWARD P. THOMPSON, OF ELIZABETH, NEW JERSEY.

## METHOD OF CARBONIZING FILAMENTS FOR INCANDESCENT ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 331,663, dated December 1, 1885.

Application filed April 8, 1884. Serial No. 127,062. (No specimens.)

*To all whom it may concern:*

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

My invention relates to the methods or processes of preparing incandescent filaments for electric lamps by carbonization.

In the preparation of carbon filaments it has been customary to form the fiber or the material which is to form the bases of the filament into the desired shape, and to subject it while still retained in that form to sufficient heat to remove other substances than the carbon. Each filament has usually been separately formed into the desired shape and treated separately.

The object of my invention is to provide means for preparing a large number of filaments for carbonization at the same time, for subjecting them by a single operation to the carbonizing process, and for insuring that they shall all be of the same size, form, and perfectness.

The invention relates to the supporting of the carbonizable filament upon a forming-block, to winding about the said filament a ligature at right angles thereto, and to cutting said filament at one or more points before carbonization.

In carrying out my invention I prefer to use a block of carbon as a support for the filaments, and upon this block, if the filaments are to be formed from parchmentized threads, I wind the same helically. The form of the block is such that when the filament is wound upon it it will be bent into the form of loops, which have the shape which it is desired shall be retained by the carbonized filaments, and the thread, after being wound upon the block, is retained in position by means of string wound transversely across the same. When thus prepared, the filaments are preferably covered with pulverized carbon or coke, and placed in a crucible, which is preferably of earthenware, but may be of iron or nickel, and the entire number of filaments are at the same time subjected to heat in the usual manner.

During the process of carbonizing the string employed for holding the filaments in place is itself carbonized, and it is readily removed when the filaments are to be removed from the block.

It is well known that during the process of carbonizing the filaments contract in length, and to permit such contraction I prefer to cut the thread which has been wound upon the block across the lower ends of each loop, thereby permitting the ends to draw toward the bent portion of the loop by the contraction.

The block upon which the filaments are wound is preferably of carbon, but it may be of wood, in which case the shrinkage of the wood itself will in some degree compensate for the shrinkage of the filaments, and in such case it may not be necessary to cut the filaments themselves until after they are carbonized.

In instances where it is desired to employ bamboo fibers instead of parchmentized thread for forming the filaments, it is desirable to temporarily support each piece of the fiber in position by means of wax, or in some other convenient manner, and then to employ the string for binding them closely to the block in the same manner as described above.

It is usually preferably to so construct the supporting-blocks that each complete convolution formed upon the same will produce two carbonized filaments, so that by cutting the same upon the opposite sides of the center of the block two loops will be formed having their ends confronting each other.

In some instances it is desirable that the carbonized filament should have a greater diameter at the loop than at the ends, and for this purpose it will be desirable to construct the double form of supporting-block of less thickness through its center than near its edges. In winding the carbonized thread upon such a block it will be necessary to provide some means for permitting the same to be drawn down by the winding strings into the hollowed surfaces thus formed. To accomplish this result, suitable blocks, capable of taking up as much of the parchmentized thread as will be necessary to allow it to be pressed into the hollow spaces, are laid upon

the sides of the block while the thread is being wound. These blocks are then removed, and the subsequent winding of the supporting strings presses the thread downward into the hollow spaces, and fitting it tightly against the surface of the forming-block.

In the accompanying drawings, which illustrate my invention, Figure 1 is a perspective view of a forming-block illustrating the method of supporting the threads or filaments which are to be carbonized. Figs. 2 and 3 illustrate certain modifications in the construction of the forming-blocks. Fig 4 illustrates the method of applying bamboo fibers or strips.

Referring to the figures, A represents a block or plate of carbon, upon which is wound a thread or a parchmentized fiber, B. This thread is wound helically from the end  $a'$  to the end  $a''$ , and each convolution of the same affords two bent loops,  $b'$  and  $b''$ . When the filament B has been wound in position, the separate convolutions lie close together, but do not touch each other. A string of cotton or other suitable material, C, is wound lengthwise upon the plate A, and this string holds the separate convolutions in position. The two ends of the filament B may be held in position during the winding of the string C by small pieces of wax e, or by other suitable means. When the string has been applied, each convolution of the thread will be securely held in position, and they are then cut apart along the center line of the carbon plate, as shown at f. There will then be formed two loops,  $g'$  and  $g''$ , from each convolution of the thread. By cutting the ends of the filaments, as described, the shrinkage of the same will be permitted without rendering them liable to break and without lessening their strength.

Having been thus prepared, the plate or block of carbon is placed in the crucible, which preferably is packed with pulverized carbon, and the cover of which is luted on. It is then subjected to heat, and the subsequent process is essentially the same as that usually adopted in carbonizing filaments. The string will be reduced to carbon during the process; but it will retain sufficient tensile strength to hold the separate loops in position until the carbonization has been effected to such a degree that they will themselves retain their forms and positions.

In instances where it is desired that the ends of the filaments shall be closer together than the two arms near the loop, they may be formed upon single blocks or plates, as shown at B' in Fig. 2, the thread being wound upon the same and held in position in essentially the same manner as described with reference to Fig. 1.

The form of filament illustrated in Fig. 2 may, it is evident, be variously modified by changing the shape of the forming-block.

In Fig. 3 a modification is illustrated where-

by the double block described with reference 65 to Fig. 1 may be employed for constructing filaments of the form shown in Fig. 2. For this purpose the block B' is hollowed out toward its center, as shown at h, and it is designed that when the parchmentized thread 70 is applied to this block it shall be pressed downward to conform to the hollow surfaces. For this purpose two supplementary blocks,  $h'$  and  $h''$  are employed. These blocks fit into the hollowed portions  $h$  and project outward 75 from the surfaces of the block B' a sufficient distance to compensate for the depressions  $h$ . As great an amount of thread will therefore be required in the winding as will be necessary to press inward to conform to the hollowed 80 surfaces  $h$ . After parchmentized thread is wound upon these blocks the blocks  $h'$  and  $h''$  are removed, and the string C' is applied. This string draws the thread downward into the hollow surfaces  $h$ .

The subsequent treatment is substantially the same as that described with reference to Fig. 1.

For the purpose of more conveniently winding the filament upon the blocks I prefer to 90 construct them with centers k, which permit them to be placed in lathes. By slowly revolving them the thread may be evenly and readily wound in regular convolutions.

Where it is desired to employ bamboo fibers, 95 which are usually prepared in short sections for forming the filaments, it may be necessary to apply each loop separately and to fasten its ends temporarily by means of wax, as illustrated in Fig. 4. This may be done without 100 in any manner departing from the principle of the invention. The bamboo strips having been placed upon the block and temporarily fastened by wax, the string is wound in the same manner as it is applied to the parchmentized threads.

It may in some instances be desirable to construct the supporting or forming blocks of wood instead of carbon, and the shrinkage of the 110 wood will then to a certain extent serve to compensate for the shrinkage of the filaments during the carbonization, so that the convolutions of thread are not necessarily cut along the lines f, as described.

Heretofore carbon filaments have been manufactured by winding the carbonizable filament upon convenient and suitable forms; but in the method referred to the filament is wound over a cutting-edge secured to the form, thus causing an undesirable strain upon the filament and thereby producing a weak and friable carbon filament.

I claim as my invention—

The hereinbefore-described method of preparing carbonized filaments for incandescent 125 electric lamps, which consists in winding the filaments upon a block of carbon or other refractory material having an oval or approxi-

mately oval cross-section, holding the said filaments to said form by winding a ligature about the same at right angles to the filaments, severing the filaments at one or more points, in-  
5 closing the whole within a crucible or kiln, and subjecting the same to heat, substantially as described.

In testimony whereof I have hereunto sub-  
scribed my name this 3d day of April, A. D.  
1884.

EDWARD P. THOMPSON.

Witnesses:

DANL. W. EDGECOMB,  
CHARLES A. TERRY.