

UNITED STATES PATENT OFFICE.

DETLEF C. VOSS, OF BOSTON, MASSACHUSETTS.

MAKING FILAMENTS FOR ELECTRIC LIGHTING.

SPECIFICATION forming part of Letters Patent No. 599,306, dated February 15, 1898.

Application filed August 3, 1891. Serial No. 401,577. (No specimens.)

To all whom it may concern:

Be it known that I, DETLEF C. VOSS, a citizen of the United States of America, and a resident of the city of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in the Art of Making Filaments for Electric Lighting, of which the following is a full, clear, and exact description.

This invention relates to the production of filaments for incandescent electric lamps or burners. It employs a thread of cotton or other vegetable substance and saturates it with an alcoholic solution of iodid of aluminium and then subjects the whole to a high temperature. Afterward the thread is impregnated with said solution and connected with said metallic substance, which is solidified upon and within said thread by the aid of heat, preferably employed by subjecting said filament *in vacuo* to an electric current or in any other suitable way, substantially as hereinafter described.

In practicing this invention the cotton or other vegetable thread, preferably a thread of Sea Island cotton of suitable length, is washed and cooked in an aqueous solution of ammonia, whereby the fibers are opened. The thread so prepared and partly but not wholly dried is subjected to the alcoholic solution of iodid of aluminium and further prepared, as will now be described.

The solution of iodid of aluminium is made by taking two grains of aluminium, three grains of iodine, and one pound of what is called "absolute alcohol." It should be nearly or quite ninety-nine per cent. of alcohol or even more. This mixture of iodine, alcohol, and aluminium is heated to a temperature of 160° to 170° Fahrenheit for about an hour and then cooled to a temperature of about 45° Fahrenheit. This will give a specific gravity of about 7.75. The thread already prepared with ammonia is now dipped into and withdrawn from the alcoholic solution of iodid of aluminium, at the temperature above referred to, some six or seven or more times, so that the metallic solution shall be absorbed into the thread and the iodid of aluminium taken up by the thread. This thread so satu-

rated with iodid of aluminium is then passed through a solution of ammonia, by which the iodid of aluminium is converted into oxid disseminated through the substance of the thread in granulation. The thread thus prepared is next passed through a solution of starch which is deposited upon it. On drying the filament the crust of starch is left by which the oxid of aluminium upon and within the thread is securely held to the substance of the thread, so that the thread can be handled without liability to loss of the oxid. In this condition the prepared thread is wound around separate blocks of carbon in the usual way and the whole wrapped in cotton cloth, placed in a suitable retort, and heated to the necessary degree by which the vegetable part of the prepared thread will be carbonized. The thread between the blocks of carbon should now be divided into separate lengths, each of which would be more or less of horseshoe shape. The separated lengths of carbonized thread are then heated *in vacuo* by means of an electrical current of high electromotive force, and while so heated the vapor arising from the alcoholic solution of iodid of aluminium is admitted to the heating-chamber, whereby a further charging of the carbonized thread with oxid of aluminium is secured and the oxid already deposited on and in the thread is strengthened and hardened. After this process each end or terminal of the prepared filament is enlarged or built up with oxid of aluminium, employing either the vapor of the alcoholic solution in connection with a passing electric current or by dipping the terminals into the metallic solution described and passing the electric current. After this the built-up ends or terminals are placed in a metallic tube, and the filament is then treated in an atmosphere of the vapor from the alcoholic solution of iodid of aluminium referred to until the filament is brought to the proper degree of resistance. This filament so prepared is ready to be placed in a suitable glass bulb from which the air is exhausted in the well-known manner.

The filament of this invention in light-giving qualities is most durable and efficient

with a given expenditure of electric energy, and its manufacture can be accomplished with a higher degree of precision than has heretofore been attained in the manufacture
5 of other well-known filaments.

I am aware of the patent granted to Theodore Mais, of New York, February 21, 1888, and I do not herein claim the invention by him specified and claimed in the said patent,
10 No. 378,258; but

What I do claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. A filament for electric lighting built up
15 and composed from aluminium and iodine in the manner and used in the proportions substantially as herein stated.

2. The process of building up a filament by dipping in the alcoholic solution of iodide of
20 aluminium and then charring the same, substantially as described.

3. The composition for treating, building up, and cementing filaments, consisting of

the alcoholic solution of iodide of aluminium, substantially as described. 25

4. A liquid solution composed substantially in the proportion of one pound of alcohol, three grains of iodine, and two grains of aluminium, being an alcoholic solution of iodide of aluminium as a metallic solution for the
30 treatment of filaments, substantially as described.

5. The process of building up a filament by exposing the same in a vessel or flask containing the vapor of the alcoholic solution of
35 iodide of aluminium, while an electric current is passed through the filament, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing
40 witnesses.

DETLEF C. VOSS.

Witnesses:

ALBERT W. BROWN,
JOHN F. NELSON.