

UNITED STATES PATENT OFFICE.

MATTHEW A. HUNTER OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

METAL FILAMENT.

1,023,315.

Specification of Letters Patent.

Patented Apr. 16, 1912.

No Drawing.

Application filed July 2, 1906. Serial No. 324,410.

To all whom it may concern:

Be it known that I, MATTHEW A. HUNTER, a subject of the King of Great Britain, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Metal Filaments, of which the following is a specification.

Various refractory metals such as tantalum, have heretofore been proposed as suitable materials for lamp filaments and other conductors subject to high temperatures. One difficulty in the use of some of these refractory elements arises from the low specific resistance of the material and the consequent length and small cross-section which must be given to the filament to make it operative on circuits of commercial voltages.

According to this invention, tantalum filaments are treated to increase their resistance so that they may be used on the ordinary lighting circuits, even though the filaments are of relatively large cross-section and of short length.

In applying the process a filament of pure tantalum is heated for a short time in an atmosphere of nitrogen having a pressure of, say 15 mm. This heating causes a chemical reaction between the nitrogen and part of the tantalum, probably with the production of tantalum-nitrid. The resistance of the filament is greatly increased and a filament which when cold has a resistance of 65 ohms before treatment, may have a cold resistance as high as 240 ohms after treatment lasting about one minute.

I do not wish to advance any theory as to why the treatment with nitrogen increases

the resistance of the filament, but I have found that such is the case and that a filament after treatment may be run with a brilliancy apparently equal to that of the untreated tantalum filament.

One great advantage in using my process is that the finished filaments may be much thicker, for a given voltage, than filaments of the pure metal, or, stating the principle in a different way, the filaments may be much shorter for a given cross-section.

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

1. The process which consists in heating a filament of substantially pure tantalum in an atmosphere of nitrogen, to cause chemical reaction between the nitrogen and the tantalum and thereby increase the electrical resistance of the filament.

2. The process which consists in glowing a tantalum filament in an atmosphere of nitrogen to increase the specific resistance of the filament.

3. A filament consisting substantially of tantalum, but having a specific resistance higher than that of pure tantalum because of the presence of a nitrogen compound.

4. A tantalum filament containing material produced by glowing said filament in an atmosphere of nitrogen, said filament having a specific resistance higher than that of pure metal.

In witness whereof, I have hereunto set my hand this 30th day of June, 1906.

MATTHEW A. HUNTER.

Witnesses:

EDWARD WILLIAMS, Jr.,
ARBA B. MARVIN, Jr.