UNITED STATES PATENT OFFICE.

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MANUFACTURE OF FILAMENTS FOR ELECTRIC LAMPS.

968,407. Specification of Letters Patent. Patented Aug. 23, 1910.

No Drawing. Application filed July 5, 1907. Serial No. 382,326.

To all whom it may concern:

Be it known that I, FRANÇOIS JEAN PLANCHON, citizen of the French Republic, residing at Paris, Department of the Seine, in France, have invented certain new and useful Improvements in and Relating to the Manufacture of Filaments for Electric Lamps, of which the following is a specification.

At present several processes are known whereby what are termed "metallic filaments for incandescent electric lamps" may be obtained, but the filaments so obtained do not give complete satisfaction, especially in view of the fact that they are frequently irregular in their dimensions or their resistance, so that before they can be used, it has been necessary to submit them to treatments which are generally complicated. Filaments which do not present these disadvantages may be obtained by starting with chemical compounds which are perfectly homogeneous and capable of retaining this homogeneity throughout the entire duration of the successive operations to which they must be subjected during their manufacture into filaments.

Albuminoid and proteinaceous substances, gelatin for example, have the property of combining with the anhydrids and acids of metals, such for example, as tungsten, molybdenum, uranium, titanium and tantalum, each of which pertains to the family of metals having a high melting point. In order to obtain these chemical combinations, the following method, described generally, may be employed: An aqueous or alkaline solution of albuminoid material is mixed with a solution of an alkaline salt of the said metals, then the whole is poured into a weak acid solution. A precipitate is so obtained which is washed and is then ready to be formed into the filaments.

As an example, twenty grams of albumen in alkaline solution may be mixed with one hundred grams of tungstic acid in the state of tungstate of sodium. This compound is then poured into one liter of a solution of chlorhydric acid (1/10 of acid). The precipitate obtained weighs 110 grams and contains 80 per cent. of tungstic acid. Or, 18 grams of casein in alkaline solution and 72 grams of tungstic anhydrid (WO_3) in the state of tungstate of sodium may be poured into one liter of a solution of chlorhydric acid (1/10 of acid) giving a precipitate weighing 90 grams and containing 80 per cent. of tungstic acid.

I have shown gelatin as an example of an albuminoid substance which may be combined with the metal, but it will be understood that any equivalent albuminoid capable of producing the results herein described is to be included within the scope of the claims. I also intend to include in the claims by the term "acid" of a metal of the class described the anhydrids of such metals.

This method is capable of very general application, and it may be used in the treatment of all albuminoid substances with the anhydrids or acids of the following metals having a high melting point: tungsten, molybdenum, uranium, titanium and tantalum, and it may also be used with the para- and meta-tungstic, phospho-tungstic, phospho-molybdic, silico-tungstic and silico-molybdic acids.

In order to manufacture filaments or rods from the novel compounds just described, the procedure may be as follows: One of these compounds is taken and to it there is added a sufficient quantity of water to form a more or less plastic mass which may then be formed by any of the well known methods into the filaments or articles of the desired dimensions and shape. After the filaments have been thus formed and dried, they are heated by any suitable means, and while air is excluded, to such a temperature that it becomes a conductor of electricity. The filament is then subjected to a final operation which consists in raising it progressively to a high temperature by means of an electric current in a vessel in which a vacuum has previously been formed, or which contains a gas which is inert or one at least which exerts no action upon the metal which enters into the initial composition.

One of the foregoing compounds may also be dissolved in an alkaline solution. This dissolved substance is given such a consistency that it is able to flow in a continuous manner either under the influence of gravity or under the influence of an appropriate pressure, through an orifice of appropriate dimension. The stream thus formed is received in a dilute acid solution which, by precipitation, transforms the stream into a filament of sufficient strength, which fila-

ment is then subjected to the same operations, as before.

I claim as my invention:—

1. A step in the process of manufacturing incandescent filaments from metals having a high fusing point which consists in forming a compound of an acid of such metal and an albuminoid substance, and treating the compound so formed with a weak acid solution.

2. The hereindescribed process of manufacturing incandescent filaments from metals of the class described having a high fusing point which consists in forming a compound of an acid of such metal and an albuminoid substance, treating the compound thus produced with a dilute acid to form a precipitate, forming the compound into the desired shape and treating the resulting product to convert it into an electrical conductor.

3. A step in the process of manufacturing filaments for incandescent lamps from metals having a high fusing point, which consists in forming a compound from a solution of an albuminoid substance and an alkaline salt of such metal, and treating the compound so formed with an acid to produce a precipitate which is a combination of the albuminoid substance and the metal.

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

FRANÇOIS JEAN PLANCHON.

Witnesses:

EMILE KLOTZ,

MAX DE RIRAUD.