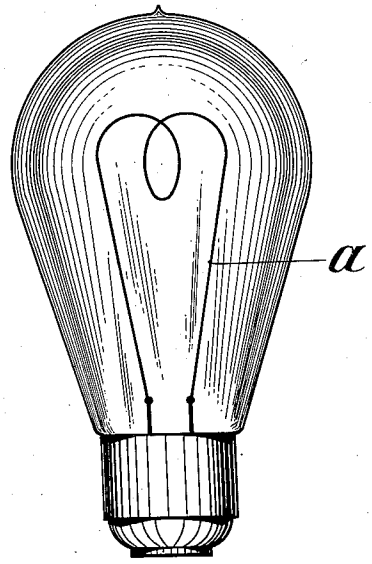
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W. VON BOLTON.

PROCESS FOR MANUFACTURING THE FILAMENTS OF ELECTRIC INCANDESCENT LAMPS.

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## PROCESS FOR MANUFACTURING THE FILAMENTS OF ELECTRIC INCANDESCENT LAMPS.

No. 891,223. Specification of Letters Patent. Patented June 16, 1908.

Original application filed December 28, 1905, Serial No. 293,616. Divided and this application filed February 24, 1906. Serial No. 302,716.

*To all whom it may concern:*

Be it known that I, WERNER VON BOLTON, chemist, a subject of the Russian Emperor, residing at Charlottenburg, near Berlin, 10 Am Lützrow, Germany, have invented certain new and useful Improvements in Processes for Manufacturing the Filaments of Electric Incandescent Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the manufacture of electric glow-lamps having a metallic filament which is inclosed in a glass-bulb *in vacuo*. Its object is to provide a filament which is refractory even at extraordinarily high temperatures, the economy of electric glow-lamps being the greater the higher the lighting conductor of electricity will be heated. I compose the filament of my improved electric lamp of substantially pure tantalum metal.

The invention consists in a process for manufacturing the filament of such lamps.

To carry out my process I proceed as follows. As tantalum metal, which is obtained in the usual way, exists in the form of amorphous powder, or at any rate in a non-coherent form, I first subject it to a condensing or welding process, in order to obtain the metal in a solid or compact state; and I then form the filament by hammering, forging, rolling, drawing or in any usual mechanical way. The finished filament may be inclosed in a glass-bulb and the air contained therein may be exhausted as is generally known in the art of manufacturing electric glow-lamps.

In the accompanying illustration I have shown, more or less diagrammatically, a lamp containing a filament formed according to this invention.

In order to first obtain a coherent metallic body of tantalum, I mix the amorphous powder of tantalum metal with suitable binding substances which may be volatile, and I have found that paraffin is a good and useful binding substance for this purpose. The resulting plastic mass may be pressed so as to take the shape which will be the most convenient for further treatment. I have also found by experiments that the amorphous powder of tantalum metal can be transformed into a body sufficiently coherent to stand the further operations by very high pressure so that in such case no binding substance is necessary. According to the pressure employed I obtain a more or less strong and coherent metallic body.

I prefer to avoid the use of binding substances in forming the body, and to condense the amorphous powder merely by sufficient pressure.

If organic binding substances are used, the resulting body is placed in an oven to drive out the binding substances. The bodies are then heated preferably by means of an electric current in the absence of air or *in vacuo* or in an atmosphere of a gas having no action upon tantalum or surrounded by an indifferent substance having no action upon tantalum. Under the influence of the heat produced by the electric current finally a welded or molten homogeneous metallic body is obtained which can be hammered or forged or rolled or drawn to wire or treated in any known mechanical way. I prefer to reduce the homogeneous metallic body obtained in the above described manner to rods or the like of suitable cross-section by pressing, rolling or the like, and then to draw wires from said rods.

The incandescent bodies obtained according to my said invention by either of the above explained modifications of my process may be employed in the usual way in a glass-bulb *in vacuo*.

To recapitulate, my process consists in converting pulverulent tantalum into a coherent mass by pressure or a binder, placing such mass in an indifferent environment, in then passing through such mass an electric current of sufficient amperage to weld or fuse the particles together into a substantially homogeneous mass and finally drawing out the mass into filament form.

The present case is a division of co-pending application, Ser. No. 293616.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare, that what I claim is:

1. The process of preparing incandescent bodies from pulverulent metallic tantalum which consists in forming a coherent body

from such pulverulent metal, heating the body in an indifferent environment until the several particles of the metal metallically unite to form a homogeneous mass, and drawing such mass down to filament form.

2. The process of preparing incandescent bodies from pulverulent metallic tantalum which consists in heating such tantalum in a state of granular agglomeration in an indifferent environment until the several particles thereof metallically unite to form a homogeneous mass and drawing such mass down to filament form.

3. The process of preparing incandescent bodies from pulverulent metallic tantalum which consists in electrically heating such tantalum in a state of granular agglomeration in an indifferent environment until the several particles thereof metallically unite to form a homogeneous mass and drawing down such mass into filament form.

4. The process of preparing incandescent bodies from pulverulent metallic tantalum which consists in forming a coherent mass from such tantalum by pressure, electrically heating the mass in an indifferent environment until the several particles thereof metallically unite to form a homogeneous mass and drawing down such mass into filament form.

In testimony whereof I have affixed my signature to this specification, in the presence of two witnesses.

WERNER VON BOLTON.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.