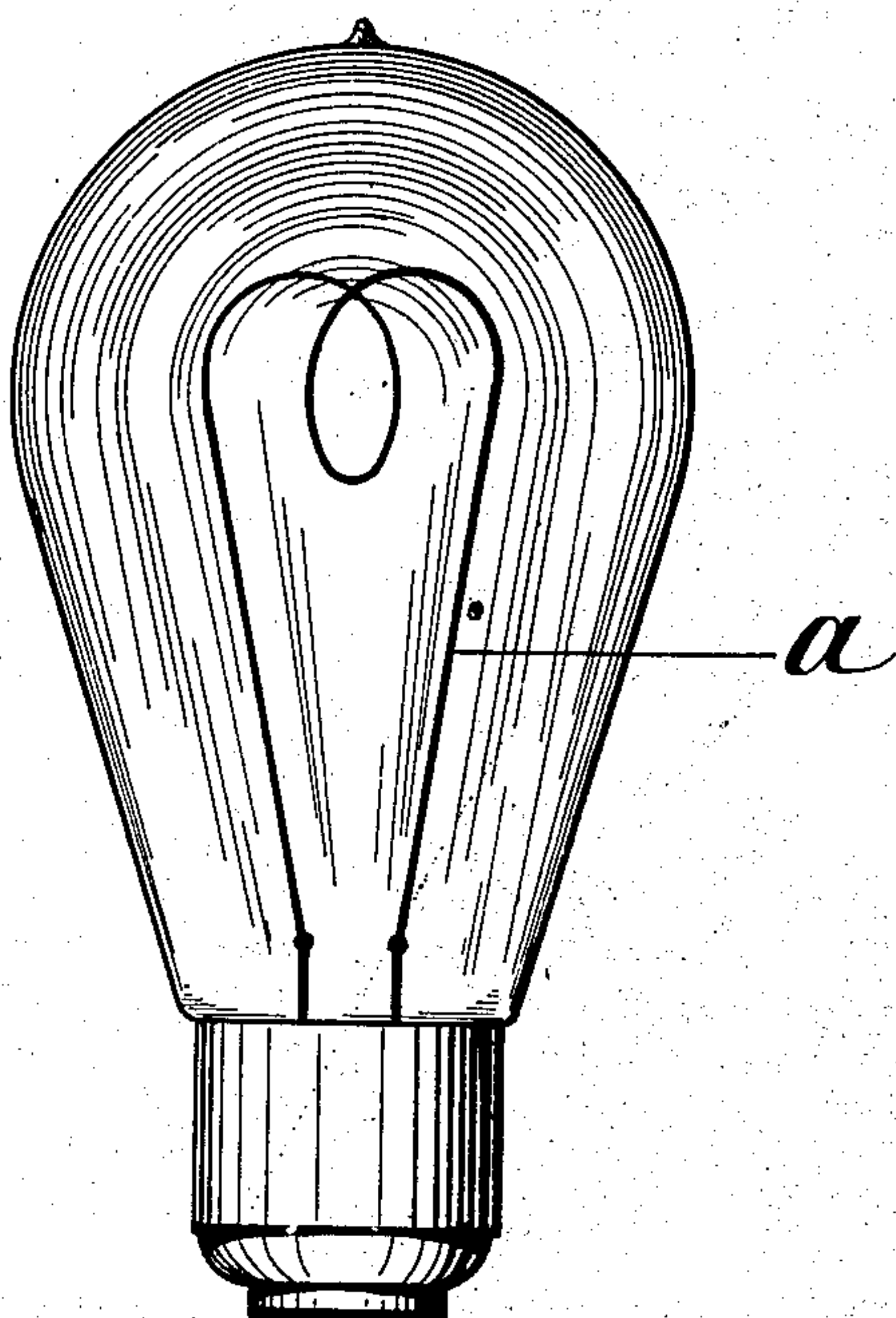


No. 817,732.

PATENTED APR. 10, 1906.

W. VON BOLTON.
ELECTRIC INCANDESCENT LAMP.

APPLICATION FILED DEC. 28, 1905..



WITNESSES

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ELECTRIC INCANDESCENT LAMP.

No. 817,732.

Specification of Letters Patent.

Patented April 10, 1906.

Original application filed May 31, 1902, Serial No. 109,793. Divided and this application filed December 28, 1905. Serial No. 293,616.

To all whom it may concern:

Be it known that I, WERNER VON BOLTON, chemist, a subject of the Russian Emperor, residing at 10, Am Lützow, Charlottenburg, near Berlin, Germany, have invented certain new and useful Improvements in 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.

My invention relates to improvements in incandescing bodies for electric glow-lamps, and in particular to metallic filaments for such glow-lamps.

The object of my invention is to provide an incandescing body for electric glow-lamps which will have a high light-emitting efficiency, will give a light of color suitable and pleasing for illuminating purposes, will be sufficiently durable to meet commercial requirements, and which can be manufactured at a reasonable cost.

With this object in view my invention consists in an incandescing body for electric glow-lamps formed of one of the metals of the vanadium group—for example, substantially pure metallic tantalum. I use the term "substantially pure metallic tantalum" to distinguish the material employed by me from a material which has heretofore been known and called "metallic tantalum," but which, as a matter of fact, was always combined either chemically or in the form of an alloy with some other materials—as, for example, the alloy of tantalum with hydrogen.

The properties of the substantially pure metallic tantalum are radically different from the material hitherto known and supposed to be metallic tantalum. While the material hitherto known was said to be brittle and could not be wrought, substantially pure metallic tantalum is exceedingly ductile and can be wrought—that is to say, welded, rolled, hammered, and drawn—in other words, manipulated in a manner which differentiates it essentially from the material hitherto known and supposed to be metallic tantalum. Thus from the material employed by me a wrought filament may be produced, while from the material hitherto known the production of such a filament was an impossibility.

I have discovered that substantially pure metallic tantalum has properties which specially adapt it for use as a glower for incandescent lamps.

A filament of substantially pure metallic tantalum has a light-emitting efficiency far superior to the carbon filament now in general use and gives a light which, while very brilliant, is not marked by any disagreeable color, but, on the contrary, is very satisfactory for purposes of illumination. Moreover, such a filament is homogeneous and sufficiently durable to meet all commercial requirements and can be produced at a reasonable cost.

I have discovered several processes of manufacturing my new filament; but the method of manufacturing forms no part of the present invention, which is for the incandescing body itself irrespective of the method of manufacturing it. In order, however, to comply with the statute, I will now describe in a general way the manner of producing my new filament.

In the accompanying drawing I have illustrated a glow-lamp having a filament in one of the many forms in which my invention may be employed, it being assumed that the particular filament illustrated is composed of substantially pure tantalum metal.

In order to first obtain a coherent metallic body of tantalum, I mix the amorphous powder of tantalum metal (in which form the impure metal commonly occurs) 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 or tantalum metal can be transformed into a coherent body by very high pressure, so that 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, such as paraffin, 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*.

5 Under the influence of the heat produced by the electric current finally a sintered or molten homogeneous metallic body is obtained, which can be hammered or forged or rolled or drawn to wire or treated in any
10 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
15 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
20 bulb *in vacuo*. It is found to be unnecessary to exhaust the bulb beyond the point at which no aureole appears.

I do not claim herein the processes of making the incandescent body herein described,
25 as said processes form the subject-matter of my application, Serial No. 109,793, filed May 31, 1902, of which this present application is a division.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is— 30

1. An incandescing body for electric glow-lamps, consisting of substantially pure metallic tantalum.

2. An incandescing body for electric glow-lamps, consisting of a wrought metal of the vanadium group. 35

3. An incandescing body for electric glow-lamps, consisting of a wrought filament of metallic tantalum. 40

4. An incandescing body for electric glow-lamps, consisting of a drawn wire of metallic tantalum.

5. A filament for use as a glower for an incandescent electric lamp, composed of ductile tantalum. 45

6. An incandescing body for electric glow-lamps, consisting of a homogeneous metallic wrought filament of tantalum.

In testimony whereof I affix my signature 50 to this specification in the presence of two witnesses.

WERNER VON BOLTON.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.