UNITED STATES PATENT OFFICE.

ANTON LEDERER, OF ATZGERSDORF, NEAR VIENNA, AUSTRIA-HUNGARY.

MANUFACTURE OF INCANDESCENT BODIES OF METALLIC TUNGSTEN OR MOLYBDENUM FOR ELECTRIC INCANDESCENT LAMPS.

1,079,777. Specification of Letters Patent. Patented Nov. 25, 1913.

No Drawing. Application filed August 25, 1906. Serial No. 332,076.

To all whom it may concern:

Be it known that I, ANTON LEDERER, a subject of Austria, residing at No. 83 Atzgersdorf, near Vienna, in the Province of Lower Austria, Austria-Hungary, have invented new and useful Improvements in the Manufacture of Incandescent Bodies of Metallic Tungsten or Molybdenum for Electric Incandescent Lamps, of which the following is a specification.

My invention relates to an improved process of manufacture of incandescent bodies of metallic tungsten or molybdenum for electric incandescent lamps, this process differing from other similar processes already known by the fact that there is added to the sulfids or oxids of the said metals, and if desired to the metals themselves, used as the starting materials of manufacture amorphous sulfur and the mixture intimately kneaded to a pasty mass. Then from this mass may be produced by pressure filaments, bars or similar bodies, the conversion of which into bodies of pure metal is carried through by means of any of the processes already known for that purpose.

Amorphous sulfur, as already known, being a soft, plastic mass,—when used as binding material in the process of making metallic filaments or bars of tungsten or of molybdenum offers considerable advantages over organic binding materials, viz: It secures a reliable and unhindered carrying through of the process. The use of other kinds of sulfur as for example of rhombic or of monoclinic or other sulfur does not suit for the purpose of the present invention because the use of such a kind of sulfur would absolutely necessitate an intense heating of the cylinder of the press in order to allow the production by pressure of the bodies in the desired form. The powdered sulfur if so heated would not only react upon the tungsten and molybdenum, but it would attack the metal of the cylinder of the press too, whereby not only the mixture under pressure would be injured but in consequence of the secondary reaction of the sulfur the plunger of the press would strongly adhere to the wall of the cylinder and interfere with the continuation of the pressing process.

In order to practically carry out this invention I proceed as follows: I intimately mix either the sulfids of tungsten or of molybdenum alone or with some of the metals or of some oxid of the metals added thereto (eventually at a slightly elevated temperature) with amorphous sulfur and make of this mixture a paste by kneading; this paste is then worked into filaments or other body by forcing it through a die or by pressing it in any other way. Filaments or bars or other bodies thus obtained soon stiffen when exposed to air. They are then heated in a reducing gas as for example in hydrogen; the sulfur contained in the bodies combines with the hydrogen to sulfereted hydrogen and the body is converted into a metallic body. These bodies are finally highly heated under exclusion of air by means of the electric current passed through same whereby the bodies sinter and become coherent.

In the same manner as above described I may work metallic tungsten or metallic molybdenum or mixtures of both metals with amorphous sulfur. In this case it will not be necessary sometimes to heat the filaments, bars or similar bodies (obtained by pressure) in a reducing gas, as the filaments or bars are already conductive and the sulfur vaporizes, when the filaments or bars are heated (under exclusion of air) by the electric current passed through.

It is evident that instead of the pure metals or of the sulfids of same, also their oxids may be used and treated in the same way.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The process of manufacturing metallic filaments for incandescent electric lamps, consisting of intimately mixing amorphous sulfur with the other constituents used in making the filaments, kneading the mixture to a pasty mass, forming filaments from this paste by pressure, exposing the same to air, heating the bodies when stiff in a reducing gas, and finally passing an electric current therethrough *in vacuo*.

2. The process of manufacturing metallic filaments for incandescent electric lamps, which consists in intimately mixing amorphous sulfur with the sulfids of tungsten, kneading the mixture to a pasty mass, forming filaments from the paste, drying the same in the air, heating the same when stiff in the presence of a reducing gas, and passing electric current therethrough.

3. The process of manufacturing tungsten filaments for incandescent electric lamps, which consists in intimately mixing amorphous sulfur at a moderate temperature with a tungsten compound, kneading the mixture to a pasty mass, forming filaments therefrom, drying the same, heating the dry filaments in the presence of a reducing gas, and passing an electric current therethrough *in vacuo*.

4. The process for manufacturing bodies of pure tungsten, which consists in intimately mixing powdered tungsten with amorphous sulfur, shaping the mixture thus obtained into the desired form by means of pressure and finally heating the bodies to a high temperature for the purpose of removing the sulfur and consolidating the said bodies.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ANTON LEDERER.

Witnesses:
ALVESTO S. HOGUE,
AUGUST FUGGER.