Patented July 14, 1936

2,047,350

UNITED STATES PATENT OFFICE

2,047,350

CATHODE DISINTEGRATION

Paul Alexander, Brussels, Belgium, assignor to La Dispersion Cathodique (en abrégé Disca) S. A., Brussels, Belgium

No Drawing. Application November 1, 1934, Serial No. 751,091. In France October 16, 1934

5 Claims. (Cl. 91—70.1)

This invention relates to improvements made in the processes of cathode disintegration.

One of the objects of the present invention is to allow of effecting the cathode disintegration of metals in a rapid and economic manner; more particularly, the present invention allows of depositing by cathode disintegration certain metals which could not be deposited at all so far or only in an unsatisfactory manner by the same method.

The invention applies more particularly to the cathode disintegration of metals belonging to the groups of iron and tungsten (periodic systems), such as Fe, Ni, Co, Cr, W, Mo.

The invention also allows of effecting the cathode disintegration at a higher pressure than that which was necessary before.

It has now been recognized that the chemosorption and the active adsorption of gases by a metal to be deposited by cathode disintegration are intimately connected with the difficulty of effecting the cathode disintegration of the metal.

According to the present invention, the gas or gases sorbed by the metal to be disintegrated is or are liberated prior to or at the beginning of the cathode disintegration properly so called. Preferably, the liberation of the gas or gases is effected in an atmosphere of another gas capable of reacting chemically with the liberated gas or gases.

The liberation of sorbed gas is effected preferably with a highly heated cathode. The temperature at which the cathode should be heated depends on the metal to be deposited, on the chemical nature of the filling gas, and on the nature of the sorbed gas.

Any suitable means may be used for heating the cathode at the required temperature. For instance use may be made of the same current which will afterwards effect the disintegration of the cathode, or an independent heating of the cathodes may be used.

During the escape of the sorbed gas or gases, the disintegration of the cathode may be prevented by all suitable means, for instance by inserting a separating surface between the electrodes and the objects to be covered with metal, or by any other means.

It is possible to lower the temperature at which the sorbed gases are liberated by producing or by increasing the degree of ionization of the filling gas. This may be accomplished by all suitable means, such as auxiliary electrodes, X-rays, radium, or by the electrodes for the cathode disintegration, etc.

Example 1.—For effecting the cathode disintegration of cobalt, use is made of cathodes consisting of bands of cobalt having a width of 4 mm. and a thickness of 2 mm. As a filling gas, hydrogen is used at a pressure of 0.36 mm. of mercury. The cathodes are heated at a temperature of 1100° C. and the liberation of the sorbed gas (oxygen) is effected during about one minute. The cathode disintegration is afterwards effected under a lower voltage of 2000 volts during about five minutes. A metal layer of about 40 millimicrons is obtained.

Example 2.—For effecting the cathode disintegration of molybdenum, use is made of cathodes made of molybdenum wire and having a diameter of 0.8 mm. As filling gas, hydrogen is used at a pressure of 0.4 mm. The cathodes are first heated at a temperature of 1200° C. and the liberation of sorbed gas is then effected during about 2 minutes. Afterwards the cathodes are disintegrated at a lower voltage of 1900 during about 4 minutes for producing a layer of about 40 millimicrons.

It is understood that the above figures are given merely by way of example; they may vary according to the shape and dimensions of the electrodes, according to the nature of the filling gas, etc.

The present invention applies naturally to all the applications of cathode disintegration for the manufacture of heating units, for the manufacture of electric resistances, of mirrors, etc.

As said above, the temperature at which the cathodes should be heated for producing the escape of the sorbed gas or gases, depends on the nature of the metal itself. In the case of certain metals the temperature may reach the white heat. In the case of platinum, tungsten, etc., the temperature exceeds 1300° C.

I claim:

1. A process for cathode disintegration in a gaseous atmosphere of a cathode formed of a metal having a gas film bound thereto by chemosorption or active adsorption, which comprises first ionizing said atmosphere and preheating the cathode to a temperature and for a time sufficient to liberate the gas film therefrom, and then disintegrating the film-free cathode.

2. A process of cathode disintegration of a cathode formed of a metal having a gas film bound thereto by chemosorption or active adsorption, in an atmosphere of a gas capable of reacting with the gas of said film, which comprises first ionizing said atmosphere and preheating the cathode to a temperature and for a

time sufficient to liberate said gas film, and then disintegrating the film-free cathode.

3. A process for cathode disintegration in a gaseous atmosphere of a cathode formed of a metal having a gas film bound thereto by chemosorption or active adsorption, which comprises first ionizing said atmosphere and preheating the cathode to a temperature and for a time sufficient to liberate the gas film therefrom by passing a current of electricity therethrough, and then disintegrating the film-free cathode by the same current.

4. A process for cathode disintegration in a gaseous atmosphere of a cathode formed of a metal having a gas film bound thereto by chemosorption or active adsorption, which comprises first ionizing said atmosphere and preheating the cathode to a temperature and for a time sufficient to liberate the gas film therefrom by a source of heat other than the disintegrating current, and then disintegrating the film-free cathode by passing an electric current therethrough.

5. A process of cathode disintegration of a cathode formed of a metal having an oxygen film bound thereto by chemosorption or active adsorption, in an atmosphere of hydrogen, which comprises first ionizing said hydrogen atmosphere and preheating the cathode to a temperature and for a time sufficient to liberate said gas film, and then disintegrating the film-free cathode.

PAUL ALEXANDER.