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METHOD FOR PREPARING ANODES FOR CATHODIC PROTECTION SYSTEMS

Edward P. Anderson, Livingston, N.J., assignor, by mesne assignments, to Engelhard Industries, Inc., Newark, N.J., a corporation of Delaware
No Drawing. Filed Nov. 25, 1958, Ser. No. 776,206
3 Claims. (Cl. 204—38)

This invention relates to the preparation of anodes for cathodic protection purposes.

For the protection of the painted surfaces of a ship against corrosion, it has been proposed to employ electrodes insulated from the ship's hull, and to apply a potential between the electrodes and the hull. The flow of current to the painted surface has the effect of greatly reducing rusting and corrosion.

The construction of anodes for this type of system presents many problems. In this regard it has been proposed heretofore to use a titanium or tantalum base clad with platinum. The relatively thick layer of expensive platinum which is employed and the expensive cladding process make this method relatively costly.

Accordingly, a principal object of the present invention is to reduce the cost of making anodes for cathodic protection systems.

In accordance with the present invention this object is achieved by using a spray coating technique for applying platinum to titanium or tantalum. Following the spray coating, the platinum may be distributed by a burnishing operation. The anode is then immersed in an electrolyte such as sea water and current is passed between the anode and the surface to be protected. This has the effect of oxidizing any surface areas of the tantalum or titanium base which are not covered with platinum. The resultant platinum-spattered anode with spaced oxide regions on its surface maintains its form and is not subject to corrosion when used in cathodic protection systems.

The process as described above has the significant advantage of being much less expensive than the elaborate process required for the complete cladding of a titanium or tantalum base with platinum.

Other objects, advantages and various features of the invention will be apparent from the following detailed description.

As mentioned briefly above, the present invention basically involves the steps of spraying platinum on a base of tantalum or titanium, immersing the electrode in an electrolyte and drawing current from the electrode. In this process, preliminary steps for preparing the titanium or tantalum surface for spraying, and a burnishing step following the spray coating may advantageously be employed.

In the preparation of a surface for receiving a spray coating, subsidiary steps may be taken. Thus in the present case, the base of titanium or tantalum may be given a flash electroplating of platinum prior to the spray by molten droplets of platinum. The surface may also be roughened mechanically to some extent so that the subsequent spray coating of platinum will more readily adhere to the titanium or tantalum base. Sandblasting can be used as the roughening technique. The process of spraying molten platinum also serves to raise the temperature of the base. This heating facilitates the bonding of the platinum layer to the base.

The spraying operation may be accomplished through the use of a commercially available metalizing gun. In view of the relatively high melting point of platinum, a metalizing gun employing an oxy-acetylene combustion flame may advantageously be employed. In passing, it

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may be noted that a suitable metalizing gun is shown as part of the apparatus in James S. Hill application Serial No. 765,101, filed October 3, 1958.

Following the spraying operation, the covering of the titanium or tantalum base may be improved by a burnishing operation. Burnishing involves a plastic smearing such as may occur on metallic surfaces during buffing operations. In the present case, burnishing of the platinum material may be accomplished by subjecting the sprayed surface to the rubbing rotary action of a burnishing tool held, for example, in the chuck of a lathe. In one instance, a hardened tool steel burnishing tool was successfully employed. In addition, rolling or other similar mechanical operations may be employed to spread the platinum. When the spraying operation provides a sufficiently flat and uniform coating of platinum over the greater portion of the sprayed surface of the base, however, the burnishing operation need not be employed.

Depending on the type of anode which is being constructed, the formation of a complete anode assembly may take place prior to or subsequent to the spraying and burnishing operations discussed above. Thus, for example, when the metal portion of the anode is in the form of sheet metal stock, the spraying and burnishing operations would normally precede assembly with the plastic support for the anode. In cases in which the titanium or tantalum base must undergo substantial machining operations, however, these operations are normally performed prior to the spraying and burnishing steps. Two representative patent applications disclosing anodes of these two types for cathodic protection systems are E. P. Anderson, application Serial No. 754,778, filed August 13, 1958, and A. J. Zwanzig, application Serial No. 682,336, filed September 6, 1957.

The anode assembly including the platinum coated titanium or tantalum base is then secured to the hull of a ship or otherwise mounted adjacent the painted structure which is to be protected. Current at the proper level is then applied between the anode and the surface requiring protection against corrosion. The spraying process will normally leave certain areas of the titanium or tantalum material which are not covered by a platinum coating. Immersion of the anode in water, and the application of current between the anode and the surface to be protected produces a chemical reaction on the bare portions of the titanium or tantalum base. This reaction, possibly resulting from electrolytic decomposition, initially produced at the surface of the titanium or tantalum material, produces an insulating oxide which covers these bare surfaces of the base material. Thereafter, current flows from the anode surface only through the platinum surface coating. In view of the protection of the base material by the oxide layer, however, the anode assembly as a whole retains its original form and is not subject to corrosion.

Although platinum is preferred for the surface coating, it is to be noted that a noble metal coating, including a significant proportion of platinum, may also be used. In this regard, an alloy of palladium and platinum may be employed for the preparation of the anode surfaces for cathodic protection systems.

It will be obvious to those skilled in the art that many modifications may be made within the scope of the present invention without departing from the spirit thereof, and the invention includes all such modifications.

What is claimed is:

1. A method for the preparation of anodes for cathodic protection systems comprising the steps of flash electroplating a base of a material selected from the group consisting of titanium and tantalum with platinum, roughening the plated surface of the base, spraying the

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base with additional platinum to form a discontinuous coating, burnishing the sprayed surface to form an electrode, immersing the electrode in an electrolyte, and applying a voltage between the electrode connected as an anode and the electrolyte whereby an oxide layer is formed on those portions of the base not completely coated by platinum.

2. A method comprising the steps of flash plating with platinum a base made of a material selected from the group consisting of tantalum and titanium, spraying the base with additional molten platinum to form a discontinuous coating, burnishing the resulting surface, immersing the platinum-coated base in an electrolyte, and applying a voltage to the coated base connected as an anode, whereby an oxide layer is formed on portions of the base not fully coated by platinum.

3. A method of preparing anodes for cathodic protection systems comprising the steps of spraying platinum on a base made of a material selected from the class consisting of tantalum and titanium to form a discontinuous coating, burnishing the resulting surface, immersing the platinum-coated base in an electrolyte, and applying a voltage to the coated base connected as an anode whereby an oxide layer is formed on those portions of the base not completely coated by platinum.

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tinuous coating, burnishing the resulting surface, immersing the platinum-coated base in an electrolyte, and applying a voltage to the coated base connected as an anode whereby an oxide layer is formed on those portions of the base not completely coated by platinum.

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