Feb. 9, 1932. W. BIRETT 1,844,556

ELECTROPLATING APPARATUS

Filed Aug. 3, 1929

Fig. 1.

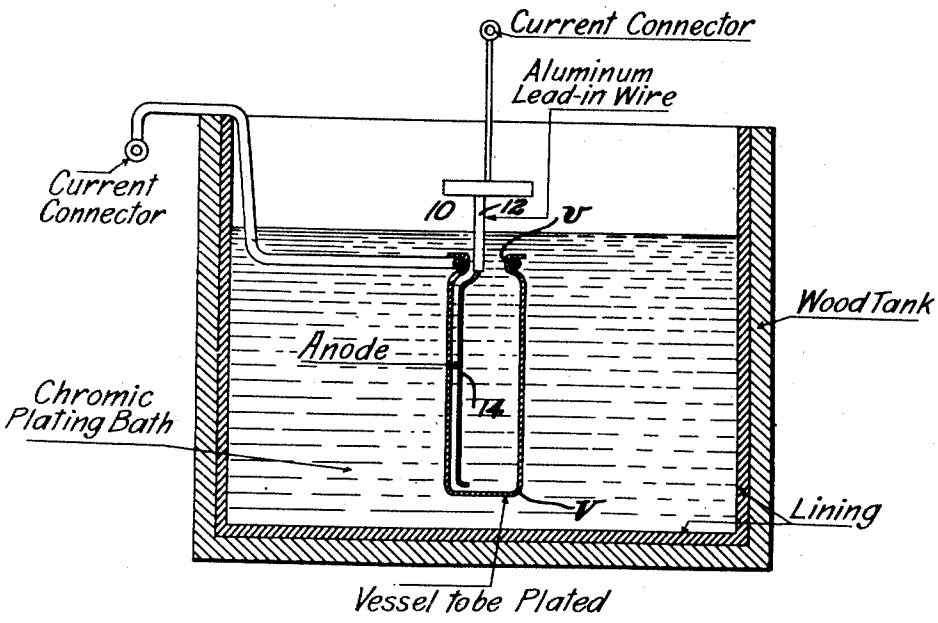
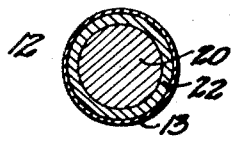


Fig. 2.



Walter Birett INVENTOR

BY

Gustave B. Thompson

ATTORNEY

Patented Feb. 9, 1932

1,844,556

UNITED STATES PATENT OFFICE

WALTER BIRETT, OF BERLIN-CHARLOTTENBURG, GERMANY, ASSIGNOR TO UNITED CHROMIUM, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

ELECTROPLATING APPARATUS

Application filed August 3, 1929, Serial No. 383,232, and in Germany September 5, 1928.

My invention relates to improvements in electroplating apparatus, and more particularly in apparatus for electroplating the inner surfaces of hollow bodies.

An embodiment of the invention is shown in the accompanying drawings.

Figure 1, shows said embodiment of the invention, and also shows its application to electroplating.

Fig. 2 is a cross-section on an enlarged scale through part 12.

In said drawings numeral 10 designates the anode as a whole, comprising the inactive portion 12 partially immersed in the solution, coated with oxide 13 formed by anodic treatment in a highly oxidizing solution. This portion 12 may constitute or act as a leading-in wire. Numeral 14 designates the active part of the anode. The active part 14 of the anode may be of any suitable material for the purpose for which the anode is used.

In electroplating the inner surfaces of hollow bodies such as the vessel V shown it is frequently necessary to introduce the anode through a comparatively small opening *v*. The risk then arises that by contact of the leading-in wire to the anode with the cathodically connected hollow body a short circuit is set up or that in consequence of an excessive passage of lines of flow of current between the anode and the edge of the admission opening as well as the adjacent parts of the surface the galvanic coating becomes excessively thick at these places at the cost of places located farther back in the interior of the body. This happens oftener the higher is the voltage required in the electroplating process. It is therefore in such cases necessary to insulate the lead to the anode. Besides a sufficiently high insulating capacity the insulation material used must also possess sufficient resistance to the electrolyte and ample strength against mechanical strains. Various kinds of india rubber and celluloid or wood are therefore usually employed while glass and ceramic materials are not sufficiently strong. In electrolytes of high oxidation capacity such as are employed in chromium plating even the various qualities of rubber are unable to resist this attack and it is therefore necessary to renew the insulating protection very frequently.

I have ascertained that this drawback may be effectively eliminated by making the leading-in wire 12 to the anode 10 of aluminium.

It is well known in the art that aluminium and also iron and other metals become passive and are stable to strong oxidizing agents, such as concentrated nitric acid, chromic acid and so on, and this known fact has already been made use of to a large extent in the industries (evaporating pans of aluminium in the chemical industry, iron containers and fittings in the chromic acid industry and so on). In all these fields of application no electric pressure has been applied to the resisting material or only a cathodic pressure for counteracting by electrochemical action any dissolution.

In contrast herewith I make use of the per se also known fact that aluminium covers itself with a protective stopping or blocking layer when polarization takes place at the anode. This stopping layer is not based upon a purely unstable passivity as it occurs in the absence of the electric current, but on the development of a dense perfectly stopping layer 13 of oxide. The aluminium acts then in its interior like an ordinary metallic conductor and toward the outside, aside from its mechanical properties, like an insulator of rubber or glass.

For carrying out this idea underlying my invention it is, of course, not necessary to make the entire leading-in wire 12 to the anode 10 of aluminium. A core 20 of copper or any other suitable metal may be densely coated with aluminium as indicated at 22 in order to increase the conductivity for a given cross-section of the leading-in wire 12. It will be readily understood that this coating, layer or sheath 22 may be produced in any suitable manner, either mechanically by rolling, pressing, spraying or wiping the aluminium on or by precipitating it electrolytically upon the core.

In order to ensure the stopping action of the aluminium from the very beginning, the aluminium may be subjected to anodic treat-

ment outside the plating bath in known suitable solutions (chromic acid, phosphate and so on) using a voltage of any desired height to initially coat it with the coating layer 13.

Aside from aluminium other metals of like properties, such as tantalum may be employed. In further following up the broad idea underlying my invention the active surface of anodes the electrolytic action of which is undesirable may be confined by screens and other suitable devices of aluminium.

I claim as my invention:

1. An anode for use in electrodeposition from highly oxidizing solutions and particularly chromium plating solutions of the chromic-acid sulphate radical type, comprising active and inactive portions normally in contact with the electrolytic solution, said inactive portions comprising aluminum having on its surface an oxidized coating of aluminum forming a stop, whereby the current is inhibited from flowing from the aforesaid inactive portions, the current flow being confined to the active portions of the anode.

2. An anode according to claim 1, wherein the active portions of the anode are a metal other than aluminum.

3. An anode according to claim 1, wherein the oxidized layer constituting the stopping portion of the inactive or stopped portion of the anode is formed by anodic action of a strongly oxidizing solution upon the aluminum.

In testimony whereof I affix my signature.

WALTER BIRETT.