

UNITED STATES PATENT OFFICE.

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ELECTROLYTIC APPARATUS AND PROCESS OF TREATING IMPREGNATORS THEREFOR.

SPECIFICATION forming part of Letters Patent No. 626,033, dated May 30, 1899.

Application filed July 9, 1898. Serial No. 685,573. (No model.)

To all whom it may concern:

Be it known that I, MARCEL PERREUR-LLOYD, a citizen of the French Republic, residing at Paris, in the Department of the Seine, France, have invented certain new and useful Improvements in Electrolytic Apparatus and Process of Treating Impregnators Therefor, of which the following is a full, clear, and exact description.

10 In the specification of Letters Patent No. 560,533 granted to me and issued on the 19th day of May, A. D. 1896, relating to the electrodeposition of copper and other metals on rotary cathodes there are described certain
15 organic membranes or materials which are arranged in light contact with rotary cathodes upon which the metal is deposited for the purpose of insuring a smooth, uniform, and homogeneous product. These organic membranes,
20 which have been and are hereinafter called "impregnators," act by momentarily covering or coating and electrically or physically insulating temporary asperities or prominences on the deposit and thus prevent or retard deposition of the metal thereon. Meanwhile the
25 molecules of metal are normally deposited around the asperities or prominences, and these latter thus become level with the general surface of the cathode. The coating or
30 covering derived from the impregnators is gradually removed by the motion of the cathode in the electrolyte and in contact with the impregnators and is also gradually renewed, but only so long as any prominence or
35 asperity exists. By this use of the impregnators I obtain deposits having remarkably excellent physical and mechanical qualities and which are also produced much more rapidly than by preëxisting methods. For
40 example, a sheet of copper one twenty-fifth of an inch thick may be obtained in about ten hours' working. This rapidity of deposit is an economical advantage, but it has also the disadvantage that owing to the heavy density
45 of the current employed a rapid heating of the electrolytic bath ensues and the increase of temperature therein may easily suffice to bring about the softening or solution of some of the albuminous or gelatinous constituents
50 of the impregnators. These constituents com-

mence to soften when the electrolytic bath reaches a temperature of about 86° Fahrenheit (or 30° centigrade) and even begin to disintegrate or dissolve in the bath. Under such a condition of temperature the controlling action of the impregnators is completely changed, and instead of temporarily coating or covering slightly the asperities and prominences parts of the impregnators may permanently adhere to and little by little
55 become imprisoned in the metallic deposit. When the metal is subsequently annealed, this imprisoned matter by its combustion produces gases under pressure which render the metal porous and short. To obviate this defect and inconvenience is the object of my invention, in carrying out which I treat the impregnators in such a manner and by such means as to render them practically insoluble and disintegratable under ordinary working
60 conditions. This may be effected, for example, by means of a solution of potassium bichromate with subsequent drying and solarization; but this method may in some cases be attended with the inconvenience that
65 unless sufficient care be taken it may introduce a foreign salt into the electrolyte. For this reason I prefer to treat the impregnators with a solution of formic aldehyde, which aldehyde, being gaseous, may be entirely
70 eliminated from the impregnators after it has acted thereon and before they are put into use.

According to my present invention, which is an apparatus and a process, the impregnators are thoroughly impregnated with the solution of formic aldehyde, after which they
75 may be copiously washed in water to remove the aldehyde, or this substance may be neutralized or rendered inoperative or inert after it has acted on the impregnators—as, for example, by means of acetic acid, which it has
80 been found will accomplish this end. The object of this washing or neutralization is that the action of the aldehyde may not be continued further than is necessary and that
85 none of it may be introduced into the electrolyte. The solution may be used in various strengths; but it is generally employed within the limits of ten per cent. and forty per cent.,
90 according to the nature of the material of 100

which the impregnators are composed, to the time within which the insolubilization must be effected, and other minor considerations, such as the temperature of the solution. For
5 example, if a forty-per-cent. solution of formic aldehyde be used the impregnators, if of the nature of parchment, may be soaked in the cold solution for about one and a half hours, be removed therefrom and dried, and be then
10 soaked in clean water for fifteen hours or until wanted. Soaking for a longer time is not prejudicial. Again, if similar impregnators are treated with a ten-per-cent. solution of formic aldehyde they may be suffered to re-
15 main in the cold solution for fifteen hours and be thereafter treated as hereinbefore described with respect to the forty-per-cent. solution. If time cannot be spared for the soaking in water, the impregnators, after removal
20 from the formic-aldehyde solution, may be heated for a short time in a bath of commercial acetic acid and be thereafter thoroughly washed in clean water.

It will be understood that, as hereinbefore
25 indicated, the strength of the formic-aldehyde solution and the duration of the period of immersion of the impregnators therein may be varied within comparatively wide limits, according to the conditions in each case. In
30 like manner the subsequent treatment may also be varied.

When the impregnators, rendered more or less insoluble, as hereinbefore described, are employed in connection with rotary cathodes in the electrodeposition of copper or other
35 metals, the metal may be deposited with equal facility in a hot or in a cold bath, and the impregnators are found to be much more durable.

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

1. In an electrolytic apparatus, the combination of an anode, a rotary cathode, an impregnator of animal-membranes having its albuminous and gelatinous constituents com-
45 bined with formaldehyde and means for holding the impregnator in light contact with the cathode.

2. The process of treating impregnators for use in electrolytic apparatus, which consists
50 in thoroughly impregnating the impregnator with a solution of formic aldehyde and subsequently rendering the aldehyde inert or inoperative by treating the impregnator in a
55 bath of commercial acetic acid.

In witness whereof I subscribe my signature in presence of two witnesses.

MARCEL PERREUR-LLOYD.

Witnesses:

GORGES RENERT,
EDMUND JOHN TURNER.