

M. M. MERRITT.
ELECTROLYTIC PROCESS AND PRODUCT.
APPLICATION FILED NOV. 2, 1917. RENEWED DEC. 4, 1919.

1,335,846.

Patented Apr. 6, 1920.

Fig. 1.

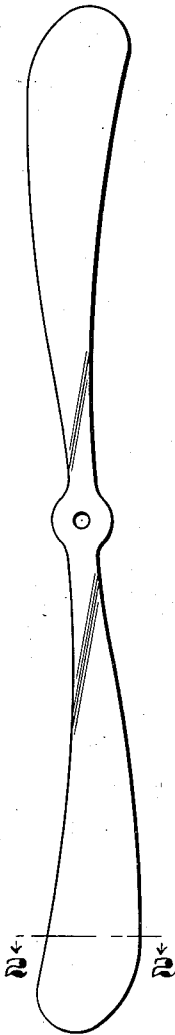
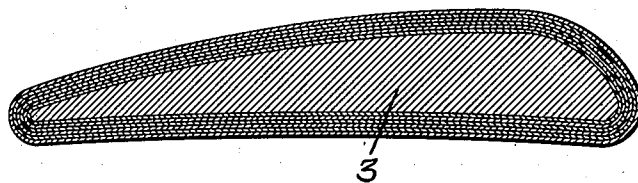


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ELECTROLYTIC PROCESS AND PRODUCT.

1,335,846.

Specification of Letters Patent.

Patented Apr. 6, 1920.

Application filed November 2, 1917, Serial No. 199,808. Renewed December 4, 1919. Serial No. 342,477.

To all whom it may concern:

Be it known that I, MATTHEW M. MERRITT, a citizen of the United States, and a resident of South Middleton, county of Essex, Commonwealth of Massachusetts, have invented an Improvement in Electrolytic Processes and Products, (A,) of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention pertains to improvements in electrolytic processes and products, and more particularly, though not exclusively, to improvements in the art of electrolytically depositing copper or other metal on the surfaces of non-conductive bodies such as bodies composed of wood.

The invention is peculiarly useful as applied to electrolytically coating with copper the surface of aeroplane propellers.

In the drawings that show one form of an illustrative embodiment of my invention:

Figure 1 shows an aeroplane propeller coated with copper;

Fig. 2 is a diagrammatic section there-through on the line 2—2 of Fig. 1.

I have found that when an aeroplane propeller is coated with an electrically conductive coating such as precipitated bronze powder and amyl-acetate or any of the more usual substitutes therefor, and electrolytic deposits of copper are made thereon, that the structure of the deposited copper is relatively coarse, and the sheet of copper comparatively brittle. I believe this to be due to the comparatively coarse structure of the bronze powder, there being a tendency for the deposited copper to partake of the general structure, so far as coarseness is concerned, of the electrically conductive body on which it is deposited. The life of the copper coating on an aeroplane propeller depends on its toughness and fineness of structure. I have found that a very tough coating of electrolytically deposited copper may be deposited by initially depositing on the electrically conductive paint or the like, a layer of copper, preferably comparatively thin, amalgamating this copper surface with mercury or with a mercury amalgam, and then depositing on the amalgam surface a second layer or lamination of copper.

The second layer of copper is of very

fine-grained, close texture because the initially coarse first copper coating has been rendered fine-grained by the application of the mercury or mercury amalgam.

It is incontrovertible that the application of mercury or mercury amalgam to a copper sheet renders the copper sheet brittle and greatly reduces its tensile strength. This weakening of the copper structure is probably due to the penetration of the mercury between the pores of the copper with resultant reduction of the cohesion of the copper. In making the experiments leading up to the present invention, I had expected that the first sheet of copper would be so weakened by the mercury that it would contribute practically no strength to the structure. I found, however, on stripping a blade made in accordance with the present invention, that the deleterious effect of the mercury on the initial copper coating appears to be corrected or, in any case, greatly reduced by the combined action of the electrolyte and the current during the subsequent electro-deposition, leaving the initial coating of copper very ductile and strong. The effect of the mercury between the first and second coating is to laminate the structure and I may, if desired, continue the laminations by amalgamating the surface of the deposited metal several times, thus producing a copper reinforcement for the propeller having any desired number of laminations.

In my co-pending application, filed herewith, I have described the use of grease in various ways to produce fineness of texture of the successive copper deposits and, if desired, to effect laminations therein. It will be understood that the present invention, and that described in my co-pending application, may be used in conjunction with one another or alternatively, the generic dominating claims being included in this application.

I have found it of marked advantage to rotate the cathode during the electro-deposition and, in the case of aeroplane propellers, it is highly desirable that the direction of rotation be intermittently reversed so that the excess of copper which necessarily becomes deposited on the advance edges of the blades during rotation will be more evenly distributed between the opposite edges of the blades.

While rotation coupled with complete im-

mersion is of advantage, I prefer to immerse only about one-half the propeller, locating the axis about which the propeller is revolved at or near the surface of the electrolyte. The propellers manufactured with partial submergence, as before described, are considerably smoother and finer grained on the surface than propellers coated in a still bath or under agitation coupled with complete submergence or substantially complete submergence.

The claims of the present application are limited to coating propellers by the application of an electrically conductive paint, and then electrolytically depositing metal thereon while rotating the propeller under partial submergence in the electrolyte. The carrying on of electro-deposition in which the cathode is alternately immersed and emersed in the electrolyte is claimed broadly in various forms in my copending applications, Serial No. 247,967, filed August 2, 1918, Serial No. 247,966, filed August 2, 1918, Serial No. 254,633, filed September 18,

1918, and Serial No. 247,964, filed August 2, 1918.

While I have shown and described one embodiment of my invention, it will be understood that I may greatly vary the same without departing from the scope of my invention, which is best defined in the following claims:—

1. The method of coating an aeroplane propeller which comprises coating the propeller with an electrically conductive paint, and electrolytically depositing metal thereon while rotating the propeller under partial submergence in an electrolyte.

2. The method of coating an aeroplane propeller which comprises coating the propeller with an electrically conductive paint, and electrolytically depositing metal thereon while rotating the propeller under partial submergence in an electrolyte, the direction of rotation being periodically reversed.

In testimony whereof I have signed my name to this specification.

MATTHEW M. MERRITT.