(No Model.)

C. B. SCHOENMEHL.

TREATMENT OF METAL PLATES PRIOR TO ELECTROLYSIS.

No. 494,231. Patented Mar. 28, 1893.

Fig. 1.

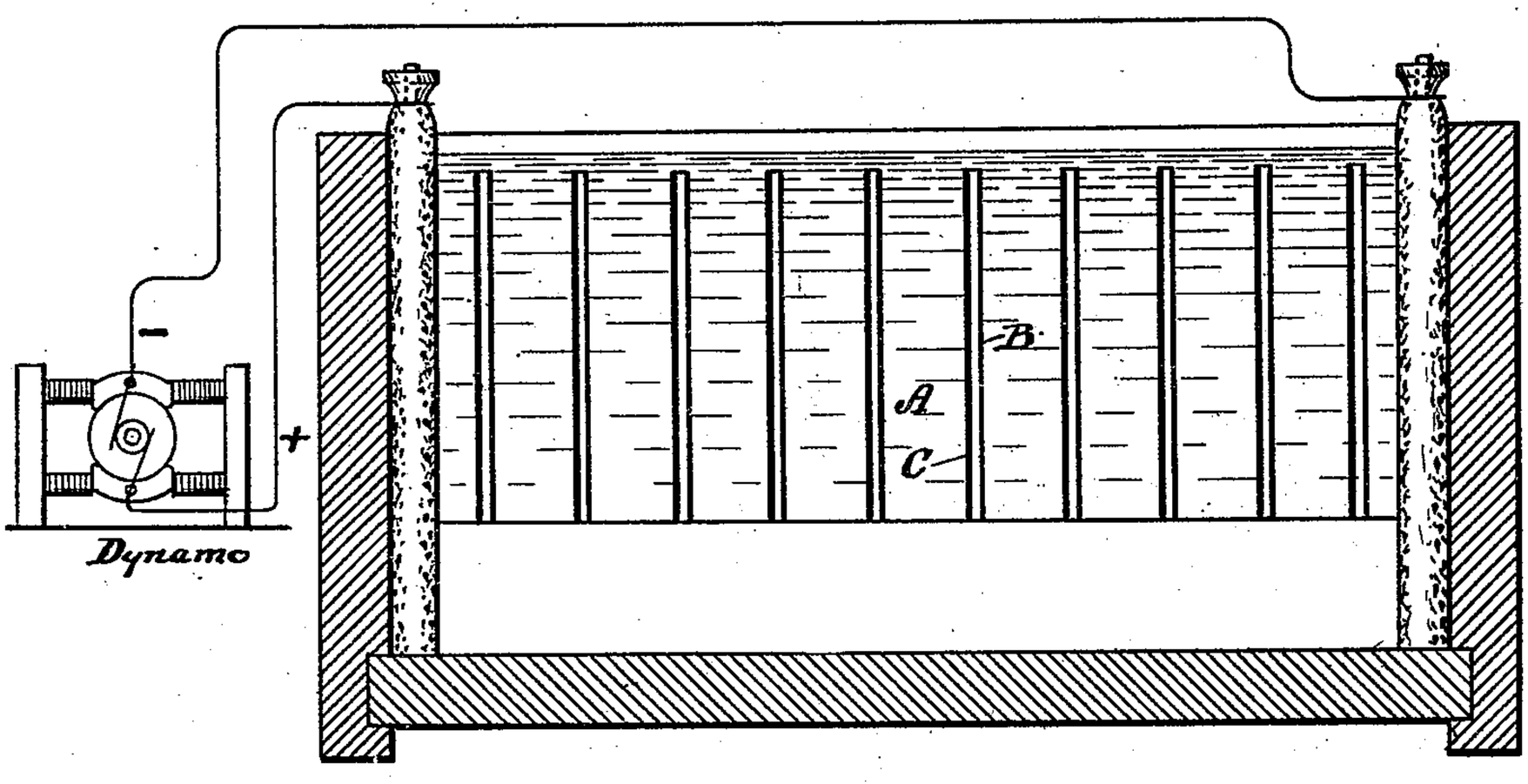


Fig. 2.

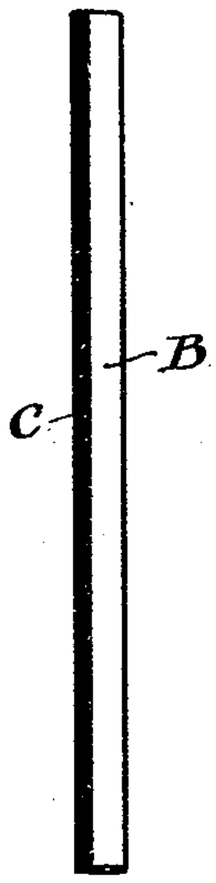


Fig. 3.

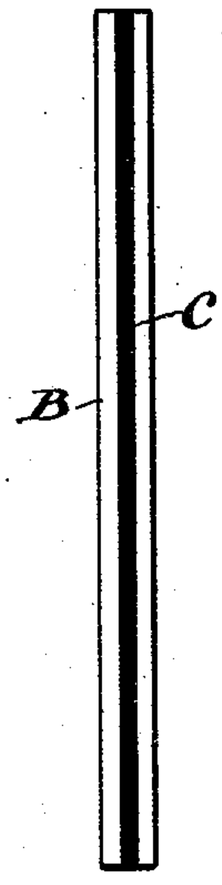
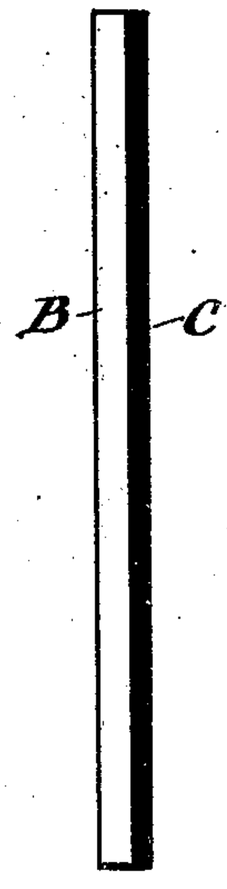


Fig. 4.



WITNESSES:

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BY

D. A. Hubbard,

his attorney

UNITED STATES PATENT OFFICE.

CHARLES B. SCHOENMEHL, OF WATERBURY, CONNECTICUT, ASSIGNOR OF ONE-HALF TO ALDEN M. YOUNG, OF SAME PLACE.

TREATMENT OF METAL PLATES PRIOR TO ELECTROLYSIS.

SPECIFICATION forming part of Letters Patent No. 494,231, dated March 28, 1893.

Application filed April 11, 1892. Serial No. 428,637. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. SCHOENMEHL, a citizen of the United States, residing at Waterbury, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in the Treatment of Metal Plates Prior to Electrolysis; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the electro-deposition of metals, but more particularly has it reference to processes of electrolysis whose object is to remove from copper such impurities and foreign bodies as are found incorporated therewith, thereby leaving the copper in its pure metallic state.

My present invention has for its object to provide a preliminary treatment for plates for the metal to be electrolyzed, and it consists in coating or otherwise affixing to that side of each plate which in the path is to be its cathode side, a conductive substance not attacked or dissolved by the chemical action of the electrolyte, but upon which copper may be electrolytically deposited as if upon a metallic surface; and for this purpose I prefer to use carbon or graphite, although I do not confine myself to these specific materials.

In order that such persons as are skilled in the art to which my invention appertains, may fully understand the same, I will now describe it in detail, reference being had to the accompanying drawings which are hereby made a part of this specification, and in which,

Figure 1, is a longitudinal sectional elevation showing a series of plates prepared in accordance with my invention and arranged in an electrolytic bath. Fig. 2, shows in edge elevation a plate ready to be inserted into the bath. Fig. 3, shows a plate at the time when the process is half completed. Fig. 4, is a similar view after the completion of the electrolysis.

The system to which my improvement is best adapted is that in which a series of plates are hung in an electrolytic bath which I designate by A in the drawings, without any electrical connection between them except through the electrolyte itself, which latter is preferably a saturated solution of sulphate of copper. The positive pole of the electric generator makes contact with the electrolyte at one end of the bath, as shown at the left of Fig. 1, and the negative pole makes contact with the other end of the electrolyte, as appears at the right of said figure. The details of these connections are immaterial in this application, but one form thereof is fully described in a certain application for Letters Patent executed by me and filed simultaneously with this application, Serial No. 428,638.

The plates to be treated may consist either of cast or rolled copper, though the rolled metal is to be preferred on account of its superior homogeneity. The difference between cast and rolled copper, however, is one of degree only, and the process is the same with reference to plates made in either way. Such plates are of any size which may be preferred, but a practical plate and one readily handled might measure from eighten inches to two feet in width by one foot in depth, and from an eighth to a half inch or more in thickness.

Each of the plates B before its introduction into the bath I coat upon one side with a layer C of some electrically conductive, non-metallic substance which is insoluble in the electrolyte. For this purpose I prefer carbon or graphite, and I do not limit myself to any specific way of applying it, though I prefer to form it into a paint paste or cement by the addition thereto of some viscous or adhesive vehicle. The plates after being thus treated I arrange in a row or line in the bath, with the layers of applied material toward the anode pole of the generator, that is, toward the left of Fig. 1, all the uncoated sides of the plates being turned toward the cathode plate. When thus treated and arranged in the bath the current from the generator is turned on and the dual process of electrolytic dissolution and deposition proceeds. The anode side of each of the plates, that is, the side which is uncoated and faces the cathode, will gradually dissolve and will be deposited upon the cathode or coated surfaces of the adjacent plates. The progress of this process may be very clearly undersood theoretically by an inspection and comparison of Figs. 2, 3 and

4, whereof Fig. 2 shows the plate with its anode side intact, as when placed in the bath; Fig. 3, shows the plate with its anode side half dissolved and a substantially equal amount of copper deposited upon its cathode side; and Fig. 4 shows the plate as having its anode side entirely dissolved and with a deposit upon its cathode side equal to the original thickness of the plate. By this it will be seen that during the continuance of the operation of the process each of the plates is losing on one side and gaining at a substantially equal rate upon the other side.

In processes heretofore used and operating upon this principle it is necessary to leave the plates in circuit until all the copper of all the plates has been dissolved and re-deposited; and as certain of the plates are apt to dissolve faster than others, a considerable amount of copper will be twice dissolved and re-deposited and this is attended with a waste of time and current. It is also difficult to tell when the whole quantity of copper has been electrolyzed, but by my process of coating the plates with the insoluble layer heretofore referred to, this is done away with and certain important advantages are gained. First, other when the whole anode side has been electrolyzed and a substantially equal quantity of metal has been deposited upon the carbon surface (compare Figs. 2 and 4) electrolysis ceases as to that plate, and second, the appearance on the anode side of the plate of the layer of carbon indicates that that plate is finished because of its contrast in color and it may then be removed from the bath, the remaining plates being left until completed. This conduces, as will readily be seen, both to economy in the use of the current and to certainty as to the purity of the metal deposited. The attached carbon is not in any way detrimental to the copper when the latter is melted preparatory to working it. Of course it is understood that in the course of this process the dissolution of the copper sets free the precious metals combined therewith, as well as any foreign substances, and these descend to the bottom of the bath and there remain as a sediment to be removed from time to time, and treated as required.

As heretofore stated, I do not wish to be limited in this invention to any special substance, nor to any specific method or means for applying it so long as the coating material is insoluble in the electrolyte and is capable of taking on metal by electro-deposition. For instance, a sheet of water-proof fabric coated with carbon or graphite might be cemented or otherwise applied to the cathode side of the plate.

I claim—

1. As an improvement in apparatus for purifying metals by electrolysis, the combination with a containing vessel having positive and negative electrodes arranged therein, of a series of plates of the crude metal to be operated upon disposed between the electrodes, each plate having one face provided with a coating or layer of material, electrically conductive, but insoluble in the electrolyte.

2. As an improvement in apparatus for purifying metals by electrolysis, the combination with a containing vessel having positive and negative electrodes arranged therein, of a series of plates of the crude metal to be operated upon disposed between the electrodes, each plate having the face thereof which is opposed to the anode coated with a layer of non-metallic material, electrically conductive and insoluble in the electrolyte, substantially as described.

3. As an improvement in apparatus for purifying metals by electrolysis, the combination with a containing vessel having positive and negative electrodes, and an electrolyte arranged therein, of a series of plates of the crude metal to be electrolyzed, arranged between the electrodes in the electrolyte, each of said plates having its cathode face coated with a layer of material electrically conductive and insoluble in the electrolyte and of a color contrasting with the color of the metal upon which it is laid, substantially as set forth.

4. The combination with the containing vessel containing the electrolyte and having the electrodes arranged in opposite ends thereof, of a series of plates vertically arranged composed of the crude metal to be electrolyzed, and arranged between the electrodes each plate having its cathode face provided with a layer of carbon or graphite, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES B. SCHOENMEHL.

Witnesses:

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