

UNITED STATES PATENT OFFICE.

JOHN M. BATCHELDER, OF CAMBRIDGE, MASSACHUSETTS, AND LUTHER L. SMITH, OF NEW YORK, N. Y.

IMPROVEMENT IN THE PREPARATION OF ENGRAVED METAL PLATES FOR PRINTING.

Specification forming part of Letters Patent No. **18,668**, dated November 24, 1857.

To all whom it may concern:

Be it known that we, JOHN MONTGOMERY BATCHELDER, of Cambridge, in the county of Middlesex and State of Massachusetts, and LUTHER L. SMITH, of the city and State of New York, have invented an Improvement in Engraved Plates; and we do hereby declare that the following is a full and exact description thereof.

It is well known that very few impressions can be taken from engraved copper plates as compared with steel ones, the relative hardness of the latter metal being such that the processes of inking, wiping, and printing have very little effect upon it.

The improvement herein described has for its object the hardening of the surface of copper plates, in order that as many impressions may be taken from them as from the steel, and also to facilitate the wiping or cleaning of the plate after it is inked. We effect this by coating the surface of an engraved copper plate with iridium, which, while it gives the requisite hard and smooth surface, does not fill up the fine work or in any way injure or obliterate the engraved lines.

The iridium for forming the metallic coating is deposited from a solution which is prepared as follows: Iridium and osmium which have been separated from the ores of platinum, or the refuse of these metals from the gold-pen manufactories, are fused with about three times their weight of nitrate of potassa for about one hour at a bright-red heat and the contents of the crucible poured upon an iron plate. After cooling the mass is broken into small pieces, which are then to be treated with nitric acid in a glass retort having a condenser, by which the osmium is separated in the form of osmic acid. The iridium remaining in the retort is to be treated with hydrochloric acid after removing the nitrate of potassa by crystallization, and we then have the chloride of iridium.

There are various other methods well known to chemists for obtaining the chloride of iridium which is thus formed, and we consider it the best solution for precipitation by the battery upon copper plates. The dimensions of the cell will depend on the size of the plate to be coated, it being two or three inches larger than the copper plate. The solution within

this cell should contain about one-eighth of an ounce iridium to a gallon of water, to which about one-quarter pound of sulphuric acid should be added. If a smaller quantity of iridium is used, it will in some cases produce a harder deposit. Four batteries are now to be arranged by connecting the zinc of the first with the silver of the second, the zinc of the second with the silver of the third, the zinc of the third with the silver of the fourth, and the zinc of the fourth to the copper plate upon which the deposit of iridium is to be made, the plate being immersed in the solution within the cell first named. From the silver of the first battery a wire is extended across the vessel containing the iridium solution, so that it will be parallel to the plane of the plate that is to be coated. To this wire should be attached, at intervals of three or four inches, strips of platinum extending nearly or quite as far down as the plate that is to be coated.

Previous to placing the plate in the solution it should be carefully examined, and if any parts are found to be oxidized or tarnished they should be carefully polished. The whole plate is to be well cleansed, so that no impurities may remain upon its surface. This is very important, as the iridium will not otherwise adhere. The time required to coat the plate cannot be definitely stated, as it will vary according to the strength of the solution and its temperature.

The plate should be raised from the solution at intervals in order to be sure that the deposition of iridium goes on uniformly, and that the fine lines of the engraved plate are not injured. We are aware that the deposit may be made by the "single cell" process and in other modes; but we prefer that above named. The plate, on being removed from the solution, is found to be coated with iridium in its metallic state, possessing great density and a high polish, its surface being in such condition that a great number of impressions may be made, and the ink can be removed with the same facility as from steel plates.

If it is deemed desirable that the intaglio parts should have a copper surface in the same condition that they are left by the graver, we fill the lines with any ink or non-conducting substance that is not soluble in the solution of

chloride of iridium, then wipe the plate in the same manner as for printing, leaving only the raised or polished part exposed to the battery action. After it is coated, as above described, the ink is washed from the lines and the plate is ready for use.

We are aware that electrotypes-plates are formed by the deposit of copper in a matrix and a back of softer metal afterward applied to them; also, that movable types in relief have been coated with copper; also, that alto-plates (the reverse of engraved plates) have been coated with silver to prevent oxidization. We therefore make no claim to these processes or their products; but

What we claim, and desire to secure by Letters Patent, is—

An engraved plate composed of two metals,

one of which is iridium, and forms the face or impression-surface of the plate, the other metal forming the back of the plate being copper, or any metal that can be engraved with the common tools used by engravers, while the printing-surface, produced as herein described, is very hard and will give a greater number of impressions than the engraved plates now in use.

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Witnesses to signature of J. M. Batchelder:

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