Sheet 1. 2 Sheets

W. H. Remington,

Electro Plating with Nickel,

No. 82,877, Patented Oct. 6, 1868.

Fig. 2.

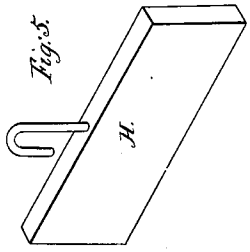
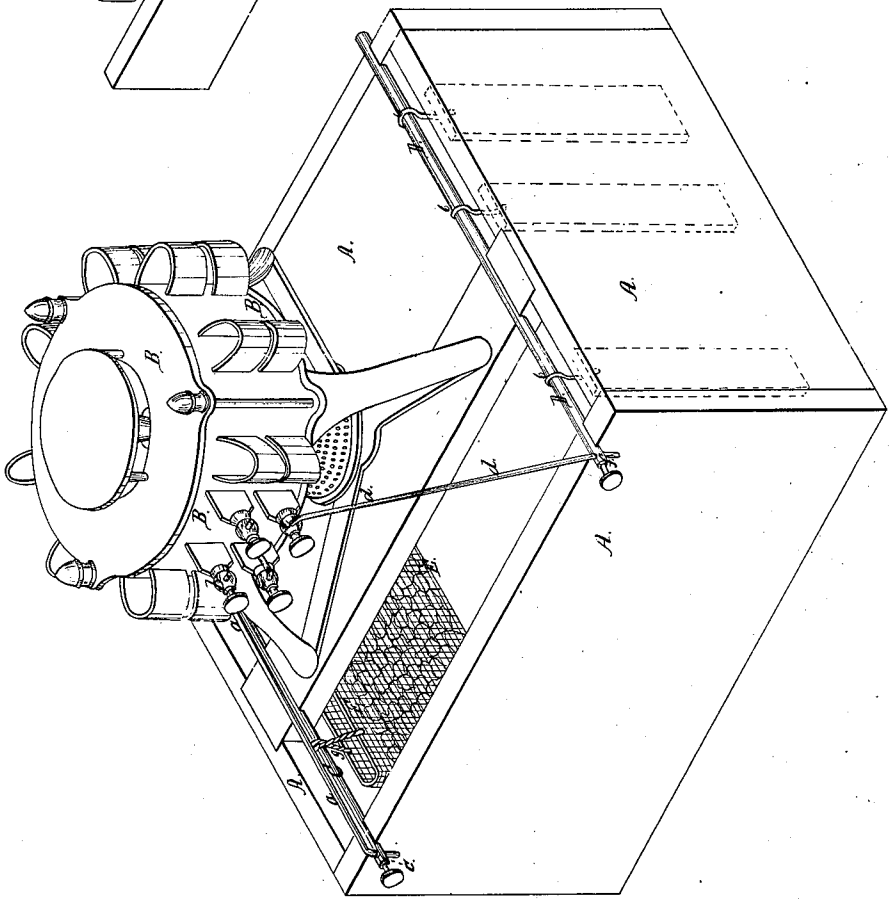


Fig. 1.



Witnesses.

E. Schmucker

N. W. Stearns.

Inventor.

William H. Remington.

Sheet 2 - 2 Sheets

W. H. Remington,

Electro Plating with Nickel,

No. 82,877, Patented Oct. 6, 1868.

Fig. 3.

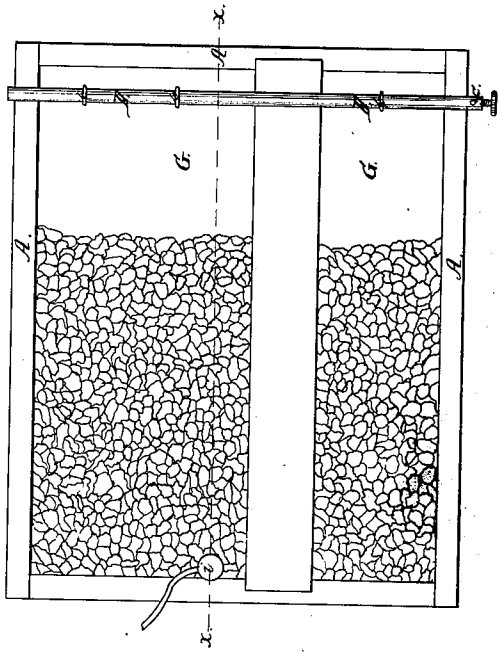


Fig. 4.

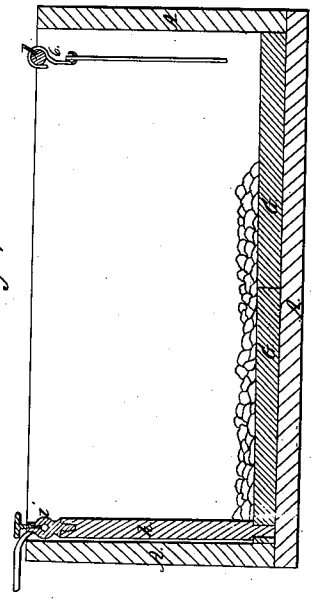
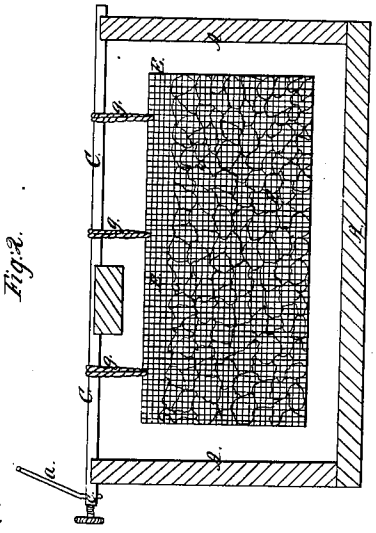


Fig. 2.



Witnesses.

E. Teschmacher

R. W. Stearns.

Inventor.

William H. Remington

UNITED STATES PATENT OFFICE.

WILLIAM H. REMINGTON, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HIMSELF, SARAH A. T. PEABODY, AND GEORGE D. ALLEN.

IMPROVED PROCESS OF ELECTROPLATING WITH NICKEL.

Specification forming part of Letters Patent No. 82,877, *dated October* 6, 1868.

To all whom it may concern:

Be it known that I, WILLIAM H. REMINGTON, of Boston, in the county of Suffolk and State of Massachusetts, have invented a Process for Electroplating with Nickel, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of the apparatus which I employ in the process of electroplating with nickel. Fig. 2 is a transverse vertical section through the same. Fig. 3 is a plan of the vat for containing the solution, the bottom being provided with a lining, to be hereinafter referred to. Fig. 4 is a longitudinal vertical section on the line *x x* of Fig. 3. Fig. 5 represents a plate coated with nickel to be used as a "positive electrode."

The employment of nickel as a substitute for silver in the process of electroplating presents many great advantages, the principal of which are, that nickel is extremely hard and susceptible of a high polish, while it will not become tarnished by age or exposure to the air; it will also withstand the action of intense heat, as it cannot be readily fused by fire; and, furthermore, its cost is trifling compared with that of silver.

It has, however, hitherto been found impossible to practically employ nickel, for the reason that it can only be obtained in small particles, and cannot, on account of its infusibility, be formed into a plate for a positive electrode, as is required, to present the necessary amount of surface, while if the attempt is made to fuse it with copper or other metal for which it has an affinity, the plate so formed would be unfit for use, as the deposit would not be pure and the desired result could not be attained.

My invention has for its object to overcome these difficulties, and to enable me to successfully employ nickel in the process of electroplating; and consists, first, in suspending or supporting a mass of the particles of nickel within the solution, so as to present an extended surface, and connecting them with the positive pole of the battery by means of platinum or other suitable conductor of electricity not materially affected by the electric current or the solution employed.

The second part of my invention consists in lining the whole or a portion of the interior of the vat or vessel which contains the solution with carbon, or other suitable conductor of electricity not materially affected by the electric current or solution, so that the particles of nickel, instead of being suspended or supported as above described, may be placed upon the lining at the bottom of the vat in such a manner as to present the desired surface, the lining of the vat being connected with the positive pole of the battery.

The third part of my invention consists in the employment of a plate of metal, carbon, or other conductor of electricity, upon which a coat of nickel of sufficient thickness shall have been deposited, as a positive electrode, to be suspended in the ordinary manner, and connected with the positive pole of the battery, instead of suspending or supporting the particles of nickel, or placing them upon the bottom of the vat, as above described.

The fourth part of my invention consists in a new and improved solution to be used in the process of electroplating with nickel.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A represents the vat or receptacle for containing the solution. B, Fig. 1, is a "battery," the positive pole of which is connected, by means of the wire *a* and screw-cups *b c*, with a metallic rod, C, the extremities of which rest in grooves in the upper edges of the vat A.

The negative pole of the battery is connected, by means of a wire, *d*, and screw-cups *e f*, with a rod, D, placed at the opposite end of the vat, and from this rod the "negative electrodes" or articles to be coated are suspended in the solution by wires 6, in the ordinary manner.

I will now describe the manner in which the particles of nickel which form the positive electrode are suspended or supported in the solution or "bath," so as to present the extended surface necessary to produce the

required result. E is a basket or receptacle, (of the form seen in Fig. 1,) composed of woven platinum wire, and suspended from the rod C by means of platinum wires *g*. Within this wire basket E are placed the particles of nickel, the mass of nickel thus suspended in the solution and forming the positive electrode presenting an extended surface to the action of the electric current and solution, and from this surface the nickel will be readily "thrown down" and deposited upon the negative electrodes suspended from the rod D. I do not, however, confine myself to the use of platinum for the purpose of suspending or supporting the particles of nickel, as any other suitable conductor of electricity not materially affected by the electric current or the solution employed may be used instead. Neither do I confine myself to the use of a wire basket or receptacle for containing the nickel, as it may be suspended in some other manner so as to present the desired surface. Instead of suspending the particles of nickel within the solution, as above described, they may be placed on the bottom of the vat, which, in such case, is to be covered or lined with carbon, G, as seen in Figs. 3 and 4, the carbon lining G being provided with a post or standard, *h*, of the same material, having a screw-cup, *i*, at its upper extremity, by which it is to be connected with the positive pole of the battery, the electric current being by this means connected with the nickel, which may be thickly spread over the bottom of the vat, as seen in Figs. 3 and 4, so as to present an extended surface, as required. Instead of a post, *h*, extending up from the lining G, the side or sides as well as the bottom of the vat may be lined with carbon, the lining being connected at any suitable point with the positive pole of the battery; or, instead of the above, a shelf of carbon connected with the positive pole of the battery may project out from the side of the vat, and the nickel be spread thereon, in which case the lining G at the bottom of the vat will not be required, and, in lieu of carbon, any other suitable conductor of electricity not materially affected by the electric current or the solution employed may be used, if preferred, as a lining or surface upon which to spread the particles of nickel; or the entire vat or any portion thereof may be composed of platinum, carbon, or other conductor of electricity not materially affected by the electric current or solution.

Instead of suspending the particles of nickel from the rod C, or otherwise supporting them, as above described, a plate of metal, carbon, or other conductor of electricity, upon which a coat of nickel of sufficient thickness shall have been deposited, may be employed as a positive electrode, the plate, H, Fig. 5, so coated being suspended from the rod C, and connected with the positive pole of the battery, so that the nickel may be thrown down or deposited from this plate in the same manner as from a plate of silver or other metal, care being taken to remove the plate before its coating of nickel has become exhausted.

In the above-described process, I prefer to first employ a strong current of electricity for "striking" or "whitening," similar to that employed in the process of electroplating with silver. The solution which I employ, and which I have ascertained to produce the best results, is made in the following manner:

I take refined nickel and dissolve it in nitric acid, slightly diluted with water, say about one-twentieth part of the latter, adding the liquid to the nickel by degrees until it is entirely dissolved. The nickel is then precipitated by the addition of a suitable quantity of carbonate of potash. The precipitate thus obtained is then thoroughly washed with pure water, after which it is dissolved in a strong solution of sal-ammoniac and filtered, when it will be ready for use. I do not, however, confine myself to the use of the above-described solution, as other solutions of nickel may be employed instead.

By means of the process above described I am enabled to effect a perfect deposition of nickel upon the negative electrode, or article to be coated, in a simple, expeditious, and inexpensive manner, which has been a desideratum hitherto unattained, and by thus overcoming the difficulties heretofore experienced I am enabled to extensively employ nickel in the process of electroplating; the peculiar properties of this metal—viz., extreme hardness and consequent length of wear, susceptibility of high polish, freedom from liability to tarnish, power to withstand intense heat, and trifling cost compared with that of silver—rendering it eminently useful and of great value for all general purposes, and especially as a substitute for silver, which, as it can only be deposited in a pure state, is necessarily soft, and consequently liable to abrasion and rapid wear, besides being extremely liable to become tarnished.

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

1. Suspending or supporting or holding a mass of the particles of nickel within the solution, so as to present an extended surface, and connecting them with the positive pole of the battery by means of platinum or other suitable conductor of electricity not materially affected by the electric current or the solution employed, substantially as described.

2. A positive electrode composed of a plate of metal, carbon, or other conductor of electricity, upon which a coat of nickel of sufficient thickness shall have been deposited, substantially as set forth.

3. The within-described solution, prepared of the ingredients and in a manner substantially as described.

4. A substance coated or plated with nickel, as herein set forth, as a new article of manufacture.

WILLIAM H. REMINGTON.

Witnesses:

P. E. TESCHEMACHER,

N. W. STEARNS.