No. 838,717. PATENTED DEC. 18, 1906.

W. S. HUTCHINSON.

PROCESS OF ELECTROPLATING.

APPLICATION FILED JULY 29, 1905.

Fig. 2.

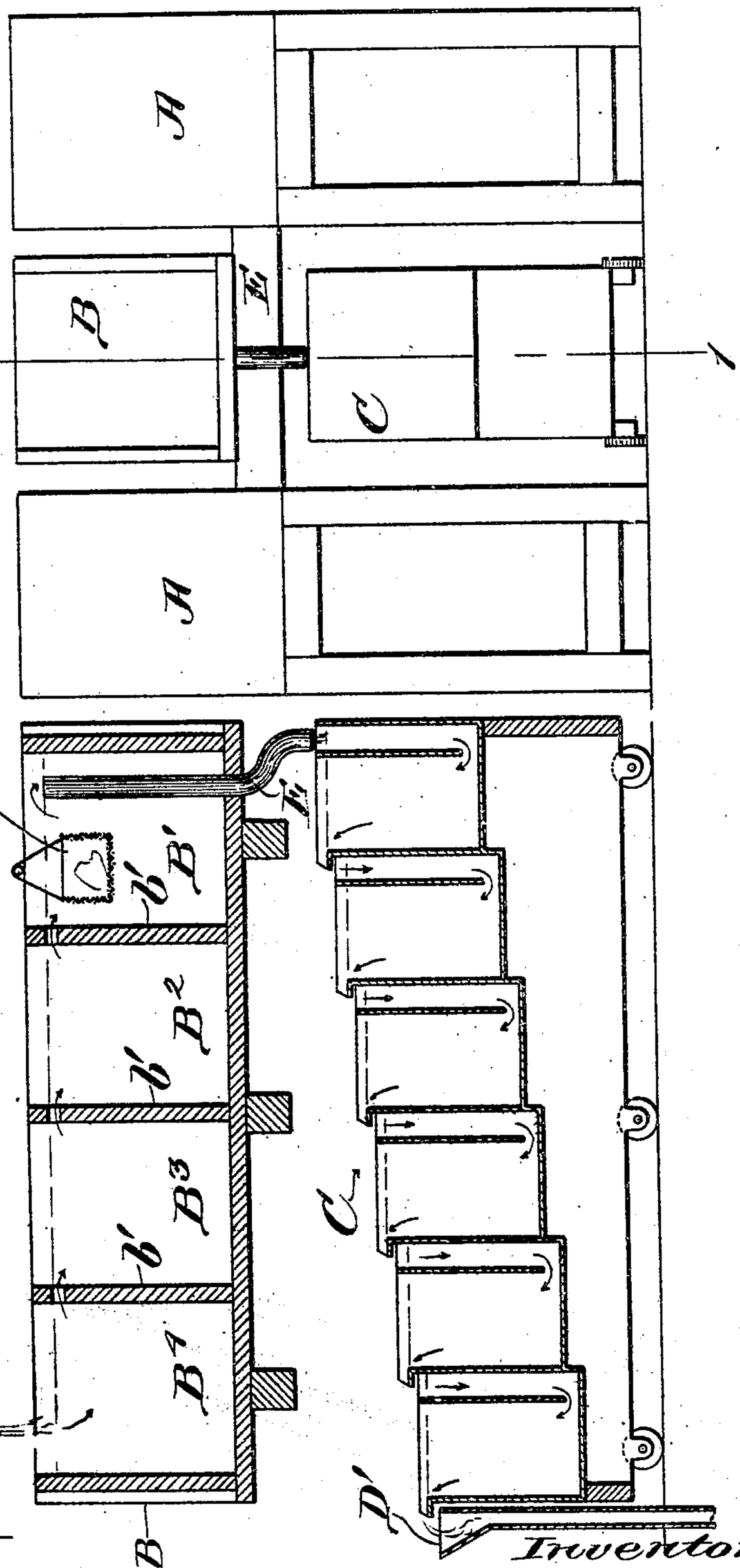

Fig. 1.

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UNITED STATES PATENT OFFICE.

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PROCESS OF ELECTROPLATING.

No. 838,717. Specification of Letters Patent. Patented Dec. 18, 1906.

Application filed July 29, 1905. Serial No. 271,813.

To all whom it may concern:

Be it known that I, WILLIAM SPENCER HUTCHINSON, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Processes of Electroplating, of which the following is a specification.

My invention relates to processes of electroplating; and it consists of a novel method whereby the valuable metallic constituents used in electroplating solutions may be economically and easily recovered.

My process is useful, particularly as an adjunct to the art of electroplating with gold. In gold-plating the articles which are coated in the plating-baths carry with them, when removed from the baths, a considerable quantity of the plating solution. It is essential to the appearance and quality of the plated articles that this solution shall be thoroughly rinsed from them, and for this reason it is and has been the practice to immerse the plated articles on removal from the plating-tanks in an abundant stream of water, which removes from them the adherent solution. This practice involves two elements of waste—first, the solution itself, which was originally rich in precious metal, is carried away in such a dilute condition that it is practically impossible to recover from it the precious matter in solution, and, second, the establishment where the plating is carried on must necessarily use an unreasonably large quantity of water for washing purposes and usually has to pay for this waste according to the record of a water-meter.

In the drawings hereto annexed I show an apparatus which is designed to carry out my improved process. This apparatus, though not claimed by me in this present application, is the subject of a contemporaneous application filed by me and is reserved for claim therein.

In the drawings, Figure 1 is a vertical longitudinal section on line 1 1, Fig. 2, of a solution-recovering device; and Fig. 2 is an end view of a typical plating equipment with my recovery apparatus incorporated therein in such manner as to perform my new and improved process.

A represents the plating vessels or tanks wherein the metal articles are immersed in order to be electroplated—say with a superficial film of gold. The gold solution—say cyanid—adheres to the plated articles when the plating is completed and they are lifted from the plating-tanks A. The plating-tanks A are arranged in two rows, and between them I erect the rinsing-tank B. This rinsing-tank is divided by partitions b' into compartments of suitable number, as B' B^2 B^3 B^4. Each partition b' terminates at a level slightly below the top of the rinsing-tank B, so that water may flow progressively from one compartment to another, and, finally, from the last compartment through a spout E, which communicates with the first of a series of zinc-boxes C. Water is supplied to the rinsing-tank B from a suitable spigot D. As the plated articles are removed from the tanks A they are first immersed in the compartment B^2 and are then progressively immersed in the tanks B^3 B^4, thus proceeding through the rinsing-tank in a direction which is the reverse of that of the flow of rinsing-water from spigot D to outlet E.

The water in the compartment B^2 in the normal progress of rinsing successive lots of plated articles contains a more concentrated solution of the plating liquid than the compartment B^3, and the same progressive relation persists through the successive compartment B^4. Furthermore, as the plated articles are shifted from one compartment of the rinsing-tank to the other in the direction named they carry a smaller and smaller proportion of valuable solution. The rinsing is progressive and cumulative in effect as the differential or fractional percentage of plating solution on the plated articles diminishes with each successive immersion. The relation between quantity of solution carried by the plated article and the strength of the rinsing liquid is thus practically maintained. It has been found in practice that plated articles may be very thoroughly rinsed by this progressive method with the employment of a very small quantity of water in circulation, and the final washing in a stream of water may be either wholly dispensed with or greatly reduced as to time and water quantity. In the instance used for illustration, where gold-cyanid solution is rinsed from the plated articles, the recovering-boxes C are filled with zinc shavings or powdered zinc, through which the rinse-water percolates progressively from box to box and finally from the last box in the series to the waste-pipe D'. The zinc in these recovering-boxes is occasionally removed and the valuable metal deposited by reaction therewith recov-

ered. In actual practice it has been demonstrated that a combined rinsing and recovering apparatus such as above described will pay for its cost several times over in a single year and that, moreover, the rinsing operation is much easier to carry on than it is by the method heretofore adhered to.

It may be found that under some conditions the liquid delivered from the first rinsing-compartment, as B^2, may not be a sufficiently-concentrated solution to be recovered by chemical deposit in the recovering-boxes in the most advantageous manner. For instance, it has been found that under some conditions the zinc in the recovering-boxes C have deposited upon them a film of gold plate, which is not the form best suited to final recovery. As a precautionary measure, therefore, and one which I recommend to be used in all instances, I provide an enriching tank or vessel B′, which receives the rinse-water from the compartment B^2 and in which I suspend a perforated basket or porous cup F, wherein is maintained a small but substantially constant supply of cyanid, such as potassium cyanid. The potassium cyanid in this cup sufficiently reinforces or enriches the rinse-water solution so that the chemical reaction in the recovering-boxes results in the disintegration of the zinc and the formation of a slime or mud from which the gold can very readily be extracted.

I believe that the simple method of chemical reaction and deposition from solution, as by zinc from cyanid solution, is the best and most economical; but there are other modes of recovery—for instance, the Siemens-Halske method of electrolytic or electrochemical deposition, which might be applied as equivalent to the deposition step in my process.

What I claim is—

1. The method of recovering the valuable ingredients of plating solutions which consists in subjecting the freshly-plated articles to successive cumulative rinsings, meanwhile causing the rinsing liquid to progress continuously in a direction reverse to the progression of the plated articles through the successive rinsings, and recovering the valuable ingredients thereafter.

2. The method of recovering gold from cyanid plating solutions which consists in subjecting the freshly-plated articles to successive cumulative rinsings meanwhile causing the liquid to progress continuously in a direction reverse to the progression of the plated articles through the successive rinsings, and thereafter recovering the gold from the rinse solution by chemical deposition.

3. The method of recovering gold from cyanid plating solutions which consists in subjecting the freshly-plated articles to successive rinsings, meanwhile causing the rinsing liquid to progress continuously in a direction reverse to the progression of the plated articles through the successive rinsings, and thereafter recovering the gold from the rinse solution by chemical reaction with zinc.

4. The method of recovering gold from cyanid plating solutions which consists in subjecting the freshly-plated articles to successive cumulative rinsings, meanwhile causing the liquid to progress continuously in a direction reverse to the progression of the plated articles through the successive rinsings, then reinforcing the rinse solution with a cyanid, then recovering the gold from the reinforced rinse solution by chemical reaction with zinc.

Signed by me, at Boston, Massachusetts, this 25th day of July, 1905.

WILLIAM SPENCER HUTCHINSON.

Witnesses:
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GRACE E. GIBBONS.