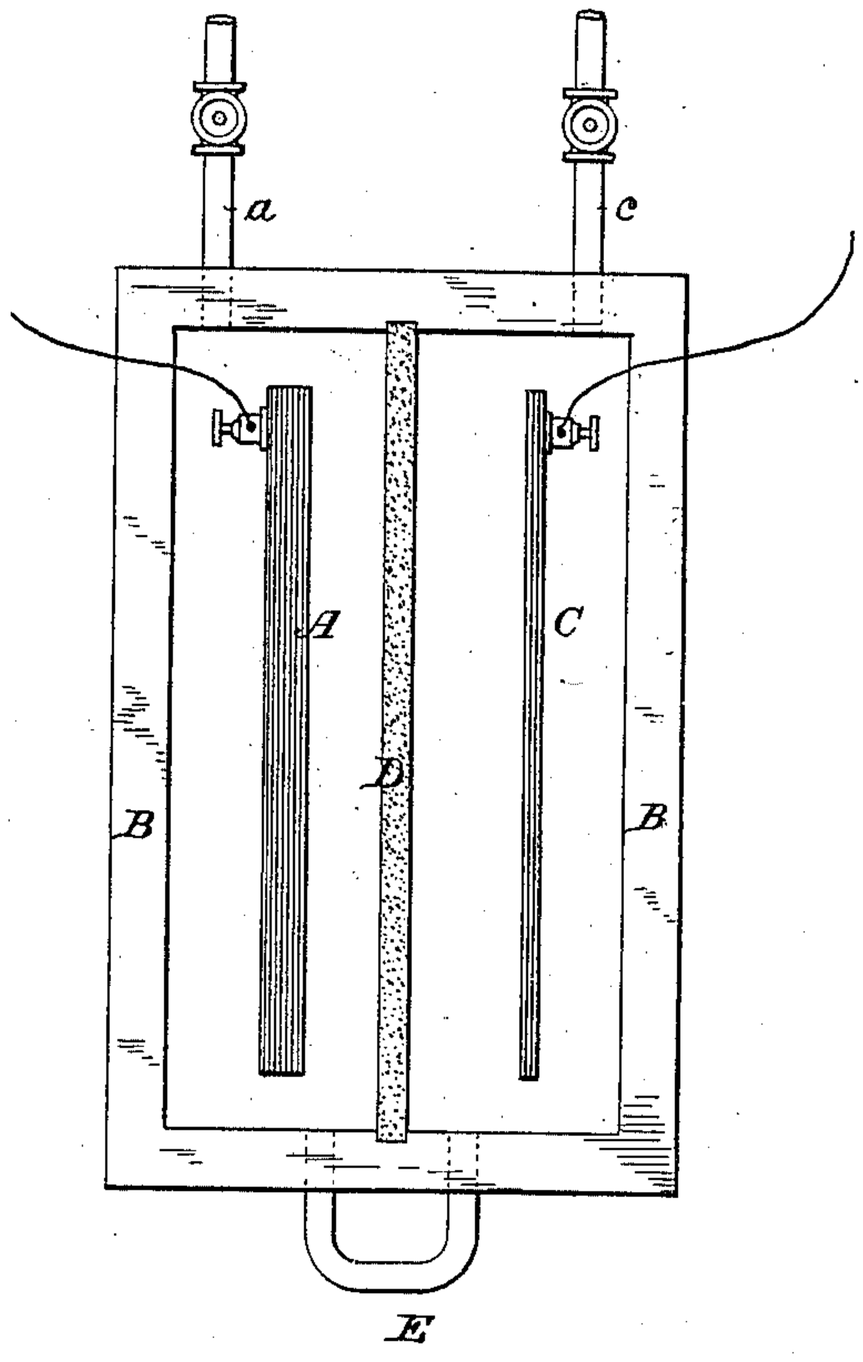
No. 704,675. Patented July 15, 1902.

D. H. BROWNE & J. M. NEIL.

PROCESS OF RECOVERING METALLIC TIN.

(Application filed July 27, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

DAVID H. BROWNE, OF CLEVELAND, OHIO, AND JAMES MILLAR NEIL, OF TORONTO, CANADA.

PROCESS OF RECOVERING METALLIC TIN.

SPECIFICATION forming part of Letters Patent No. 704,675, dated July 15, 1902.

Application filed July 27, 1901. Serial No. 69,914. (No specimens.)

To all whom it may concern:

Be it known that we, DAVID H. BROWNE, a citizen of the United States, residing at Cleveland, Cuyahoga county, Ohio, and JAMES MILLAR NEIL, a subject of the King of Great Britain, residing at Toronto, Province of Ontario, Dominion of Canada, have invented a new and useful Improvement in Processes for the Recovery of Metallic Tin, of which the following is a specification, that will enable those skilled in the art to which our invention pertains to use and practice the same.

Our invention has for its particular objects the recovery of the metallic tin from scrap-tin plates, from dross or from tin ores, the separation of the metallic tin from the recovering agent, and the regeneration of the agent, so that it may be used over and over again in the process.

The accompanying drawing is a diagrammatic plan view of one form of apparatus which may be used for the separation of the metallic tin from the liquid-recovering agent and for the regeneration of the agent.

As an example of the working of our process in the recovery of the tin from scrap tinned iron we proceed as follows: The material to be operated upon may be scrap-tin of any kind, such as clippings or old cans, which, being freed from oil or other extraneous matters in any suitable manner, is immersed in a solution of ferric chlorid, said solution being preferably heated and slightly acidulated. This solution attacks the tin or tin coatings of the material, dissolving it and holding it in solution. When the tin is thus removed from the iron plates, the latter are removed from the bath, which after having dissolved all the tin it is capable of doing loses its efficiency and becomes reduced to a solution of ferrous chlorid mixed with tin chlorid. This solution is now led to an apparatus, (illustrated by the drawing and designated by us a "recovery-bath,") wherein, as hereinafter described, the tin is electrically plated out of ferrous chlorid and the remaining solution regenerated to ferric chlorid, which may be again used in dissolving the tin coatings from further amount of tin-scrap. This recovery-bath consists of a tank B, preferably made of concrete and divided into compartments or cells A C by a diaphragm D, preferably composed of porous stoneware, asbestos cloth, parchment-paper, fiberoid, or any other suitable material which will prevent the commingling of the solutions on each side of it, yet will permit the passage of an electrical current through it. A feed-pipe *c* leads into one end of the cell C and a pipe *a* away from the corresponding end of the cell A, while the opposite ends of the cells are connected by a pipe E, through which the solution may flow from C into A. In the cell A is an anode, preferably of carbon, while in the cell C is a cathode of tin, iron, or any other suitable metal, both anode and cathode being connected to any suitable source of electric current. The solution of ferrous chlorid and tin chlorid is let into the cell C, where by action of the electric current the tin is plated out of it and upon the cathode-sheets, while at the same time the solution flowing thence through the pipe E into the cell A is there regenerated by receiving at the anode chlorin proportional to the amount of tin plated on the cathode, whereby the ferrous chlorid becomes changed back to ferric chlorid, which is conducted away from the cell A by the pipe *a* and may be again used in dissolving more tin coating from scrap, &c. The purpose of using an anode of carbon or other material insoluble in the electrolyte is to effect the regeneration of the solvent, the ferrous chlorid being reconverted into ferric chlorid by the generation of chlorin at the anode. With soluble anodes this effect cannot take place.

It should be understood that we do not limit our invention to the exact style of bath shown in the drawing and described herein, for any style of bath wherein one may obtain a deposit of metallic tin and a regeneration of the solution by its change from ferrous chlorid to ferric chlorid will come within the scope of our invention. It should also be understood that we do not limit our invention and the claims thereon to the recovery of the tin plating from scrap-tin, for it is also applicable to the recovery of tin from other tin-bearing materials, such as ores, &c.

Having thus described our invention, what we claim as new and useful is—

1. The herein-described process of extracting tin from materials containing the same, which consists in subjecting the material to a solution of ferric chlorid, thereby forming a solution of chlorid of tin and ferrous chlorid, and precipitating the tin from such solution by an electric current passing between an insoluble anode and a suitable cathode, as set forth.

2. The herein-described process of extracting tin from materials containing the same, which consists in subjecting the material to an acidulated solution of ferric chlorid, thereby forming a solution of chlorid of tin and ferrous chlorid, and precipitating the tin from such solution by an electric current passing between an insoluble anode and a suitable cathode, as set forth.

3. The herein-described process of extracting tin from materials containing the same, which consists in subjecting the material to a heated solution of ferric chlorid, thereby forming a solution of chlorid of tin and ferrous chlorid, and precipitating the tin from such solution by an electric current passing between an insoluble anode and a suitable cathode, as set forth.

4. The herein-described process of extracting tin from materials containing the same, which consists in subjecting the material to a heated acidulated solution of ferric chlorid, thereby forming a solution of chlorid of tin and ferrous chlorid, and precipitating the tin from such solution by an electric current passing between an insoluble anode and a suitable cathode, as set forth.

5. The herein-described process of extracting tin from materials containing the same, which consists in subjecting the material to a solution of ferric chlorid, thereby forming a solution of chlorid of tin and ferrous chlorid and passing such solution successively past a suitable cathode to electrodeposit the tin, and an insoluble anode to regenerate the ferric-chlorid solution, as set forth.

6. The herein-described continuous process of extracting tin from materials containing the same, which consists in subjecting the material to a solution of ferric chlorid, thereby forming a solution of chlorid of tin and ferrous chlorid, passing such solution successively past a suitable cathode to electrodeposit the tin, and an insoluble anode to regenerate the ferric-chlorid solution, and returning such regenerated solution to the tin-bearing material, as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

DAVID H. BROWNE.
JAMES MILLAR NEIL.

Witnesses:
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WM. A. SKINKLE.