(No Model.) 2 Sheets—Sheet 1.

F. A. THUM.

TANK FOR TREATING ALLOYS, &c.

No. 578,953. Patented Mar. 16, 1897.

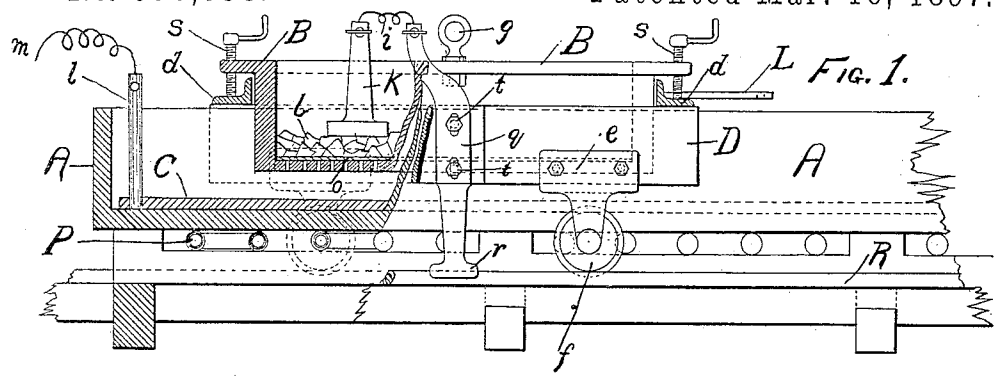

Fig. 1.

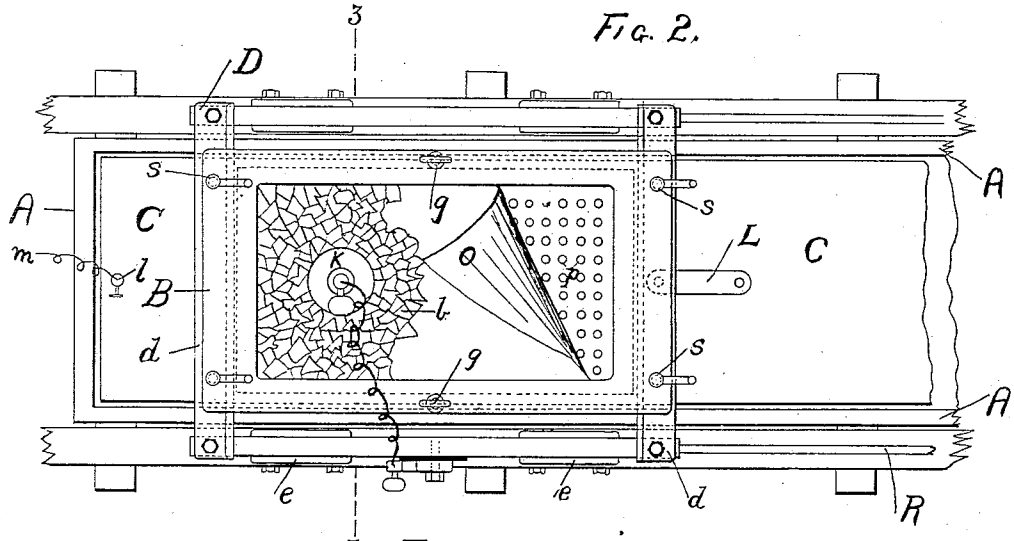

Fig. 2.

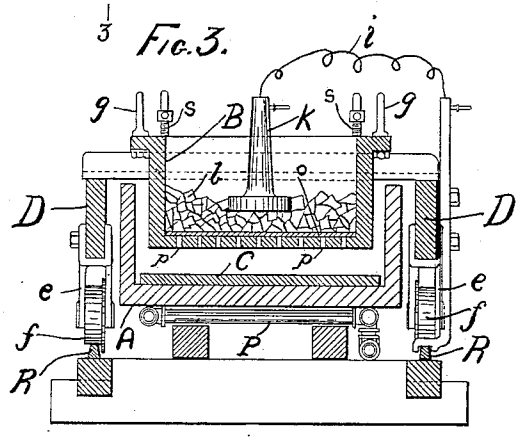

Fig. 3.

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(No Model.) 2 Sheets—Sheet 2

F. A. THUM.

TANK FOR TREATING ALLOYS, &c.

No. 578,953 Patented Mar. 16, 1897.

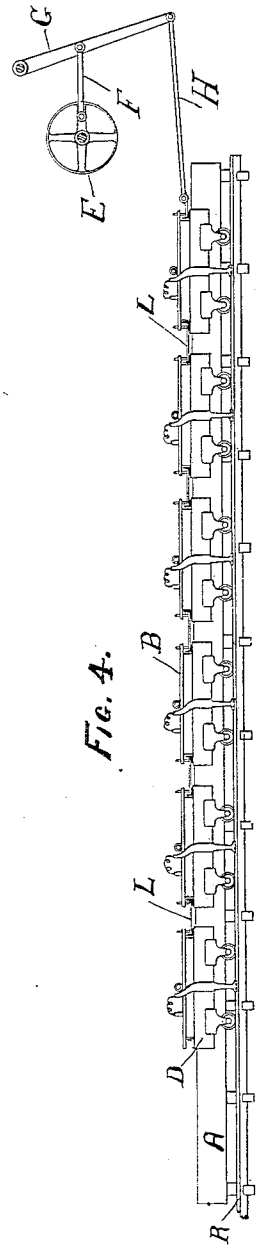

Fig. 4.

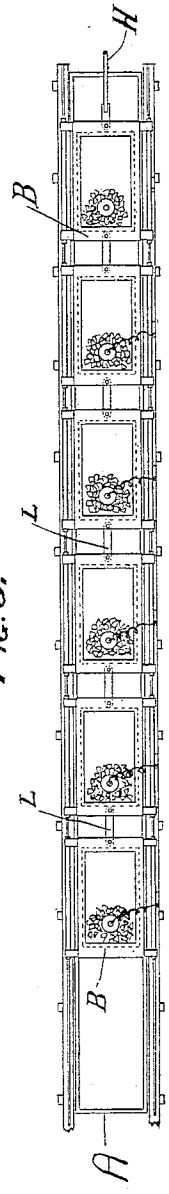

Fig. 5.

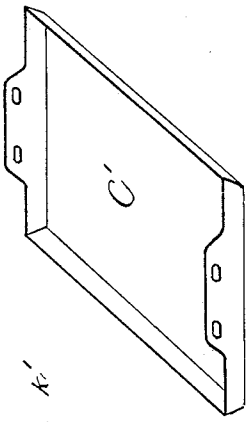

Fig. 7.

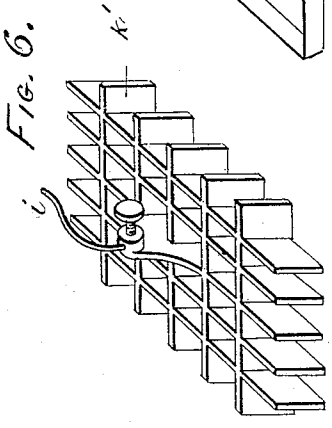

Fig. 6.

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UNITED STATES PATENT OFFICE.

FREDERIC A. THUM, OF NEWARK, NEW JERSEY.

TANK FOR TREATING ALLOYS, &c.

SPECIFICATION forming part of Letters Patent No. 578,953, dated March 16, 1897.

Application filed June 25, 1896. Serial No. 596,826. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC A. THUM, a citizen of the German Empire, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Tanks for Treating Alloys or Metalliferous Matter, of which the following is a specification.

My invention relates to improvements in apparatus for separating or extracting metals by electrolysis, its object being to insert the receptacles containing the alloy or metalliferous body into the tanks for electrolysis in such a manner that they can be readily moved within the liquid in the tank in a horizontal direction, that they can be readily inserted and lifted out, and to make them adjustable in a vertical direction for the purpose of preventing short-circuiting.

The nature of my invention will be best understood by reference to the annexed drawings, in which—

Figure 1 is a longitudinal elevation, partly in section, of an apparatus embodying my invention, part being shown broken away. Fig. 2 is a plan view of Fig. 1. Fig. 3 is a vertical section of the same on the line 3 3, Fig. 2. Fig. 4 is a side elevation, on a smaller scale, of the apparatus. Fig. 5 is a plan view of Fig. 4. Fig. 6 is a perspective view of a modified form for the anode-conductor. Fig. 7 is a perspective view of a removable tray.

Similar letters refer to similar parts throughout the several views.

In the drawings the letter A designates a tank for containing an electrolytic bath. The tank is made in the usual manner, by preference oblong, but it may also be made annular. The bottom of the tank may be kept warm by heating-pipes, such as the steam-pipes P, (shown in the drawings,) placed into the space beneath the bottom.

B are cells or receptacles for alloys or metalliferous bodies *b* to be suspended within the bath. These cells are by preference made square or oblong, of wood, metal, or other suitable material. The bottom of the cells, as shown in the drawings, has perforations *p* and is covered by a filtering-cloth *o*. (Shown partly turned up in Fig. 2.) The bottom may, however, be formed and rendered permeable in any suitable manner and the cells may be subdivided, for instance, by inserting a cellular conductor *k'*, such as shown in Fig. 6.

The cells or receptacles B are adjustably supported upon carriages consisting, in the example shown, of side pieces D, transverse pieces *d*, brackets *e*, and wheels *f*. Adjusting-screws *s*, mounted in top flanges of the cells and resting upon the cross-pieces *d*, form the means for vertically adjusting the cells upon the carriages respectively within the bath. R are rails upon which the carriages run, and one or both of which may be properly insulated and serve as electrical conductors. The carriages may, however, be constructed in any other suitable manner which will permit horizontal motion. *g g* are eye-bolts for lifting out and inserting the cells by hoisting apparatus.

When the apparatus is to be used for electrolytic purposes, I use a conductor *k* for the positive current, said conductor being, by preference, cast of the alloy to be treated and connected to the wire *i* by a suitable binding-screw. The conductor may, however, be cast in any other form—such, for instance, as the cellular form shown in Fig. 6—and it may be made of conducting material not soluble in the liquid, so as to give a large surface of contact for fine material. In the example shown the current is supplied to the anode-conductor K from the insulated rail R, through a bar *q* and wire *i*, the bar *q* having a shoe *r*, adapted to form a sliding contact with the rail and held by bolts *t*, passing through oblong holes. The current may, however, be supplied in any other well-known manner from a separate conductor with a sliding contact or with direct connection to the conductor K by means of an elastic wire permitting the motion of the carriage.

C designates a cathode to which the negative current is carried from wire *m* through bar *l*. The cathode C may be formed of one or more pieces fastened to the bottom of the tank A, each of the pieces being connected to the source of electricity. It may, however, be made of several shallow removable trays, such as the metallic tray C' shown in Fig. 7, which is placed upon the cathode C and may be lifted out by the use of forked hooks when the anode-cell is pushed aside.

By the arrangement shown the receptacles

or cells can be readily moved within the liquid in a horizontal direction. They are readily inserted and also removed and adjusted in a vertical direction, so as to prevent short-circuiting between the anodes and cathodes. The apparatus may be used for leaching metalliferous bodies and for electrolysis or for both combined. The cells B may be moved by hand or they may be connected by links L and moved by apparatus such as the rod H and arm G, operated from pulley E through a crank and link F, Fig. 4. By moving the cells back and forth stirring and mixing of the liquid is effected, gas-bubbles are driven off, and, in fact, the same effect is produced as by forced circulation of the liquid in leaching or electrolytic tanks. By disconnecting any number of the carriages, so as to leave them at the left-hand end of the tank A, an open space will be left through which deposits may be shoveled or raked out from the cathode below. In Fig. 5 the carriages are shown at the extreme right-hand position, and when stopped in this position room is left at the left-hand end for shoveling out deposits from the cathode.

Gold, silver, lead, tin, zinc, and other metals, which are mostly deposited by the electric current in a finely-divided spongy or crystalline form, may easily be removed from the tank without interrupting the process. For this purpose the anode-cells are simply rolled apart and the metal removed from the intermediate space by a shovel, or when removable cathode-trays are used they are lifted out and emptied.

When the apparatus is used for the extraction of gold or other metals from comparatively poor ores or for stripping work, such as removing tin from tin-scrap, the anode-cells B must be made extra strong, the same also for the parting of alloys, such as lead bullion, or for the reduction of galena when heavy weights of metals or ore must be charged and worked in a short time.

For refining auriferous silver the apparatus is especially applicable. The anode-cells in this case should be lined with filtering-cloth, upon which the gold, platinum, &c., remain in the form of a fine slime, while the silver is deposited upon the cathode in a granular or crystalline form and shoveled out at certain intervals through the open spaces formed between any two cells.

What I claim as new is—

1. In an apparatus of the character specified, the combination of an electrolytic tank; anode-cells with permeable bottoms; carriages constructed to support said anode-cells when immersed into the tank and adapted to be moved horizontally; one or more cathodes placed upon the bottom of the tank, and suitable electric connections for the electrodes, substantially as and for the purpose specified.

2. In an apparatus of the character specified, the combination of an electrolytic tank; anode-cells with permeable bottoms; carriages constructed to support said anode-cells when immersed into the tank and adapted to be moved horizontally; means for vertically adjusting the anode-cells upon the carriages; one or more cathodes at the bottom of the tank; and suitable electric connections for the electrodes, substantially as and for the purpose specified.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 19th day of June, 1896.

FREDERIC A. THUM.

Witnesses:
FREDERIC W. WARD,
MIRIAM LUKE.