(No Model.)

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PRECIPITATING SAFE.

No. 597,372. Patented Jan. 11, 1898.

Fig. 1.

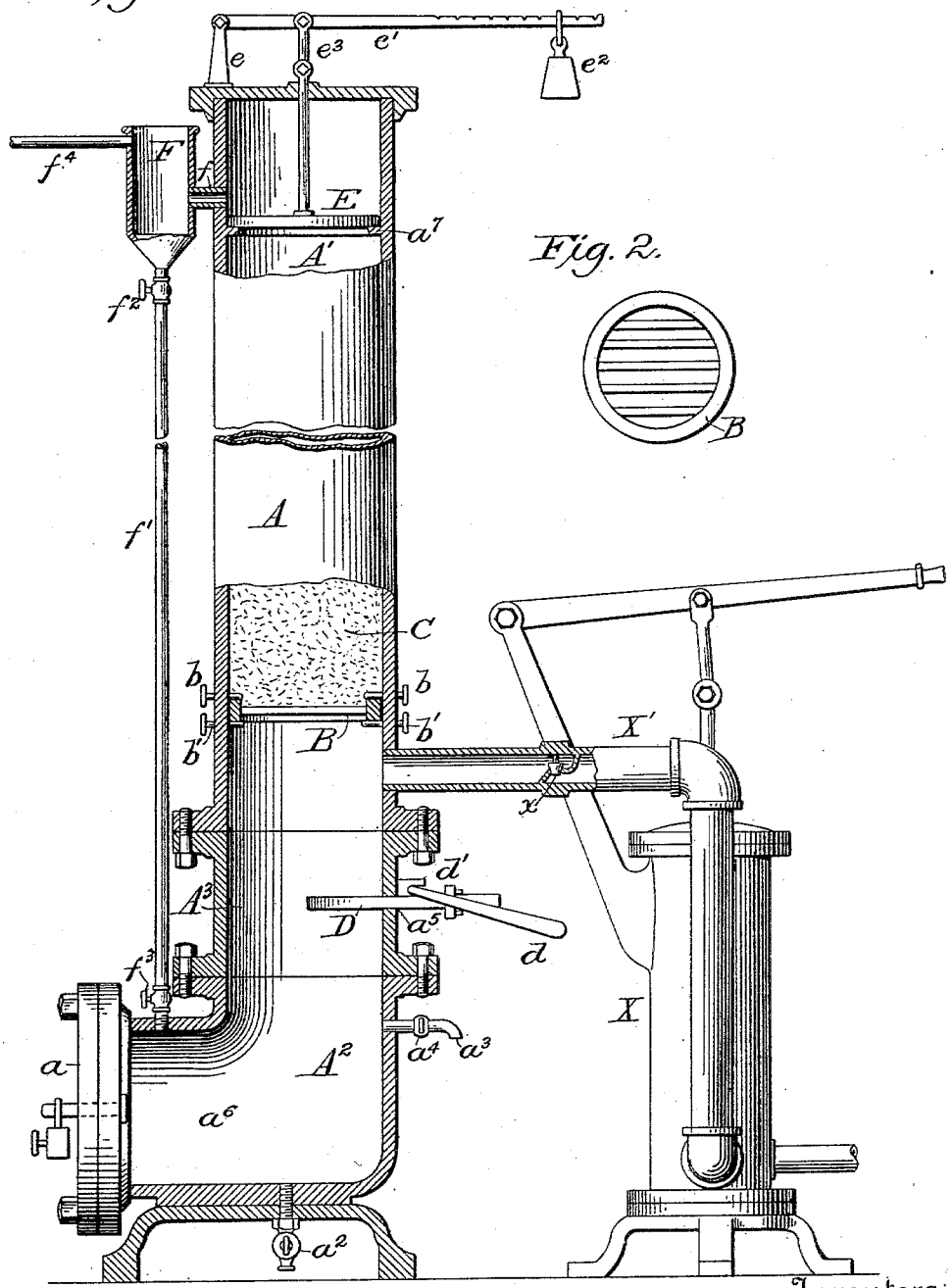


Fig. 2.

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PRECIPITATING-SAFE.

SPECIFICATION forming part of Letters Patent No. 597,372, dated January 11, 1898.

Application filed March 10, 1896. Serial No. 582,630. (No model.)

To all whom it may concern:

Be it known that we, PATRICK J. DONOHUE and JOHN F. CORKER, citizens of the United States, residing at Salt Lake City, in the county of Salt Lake, State of Utah, have invented certain new and useful Improvements in Precipitating-Safes, of which the following is a description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Our invention relates to apparatus for obtaining precious metals from solutions containing them, and more particularly to what are known as "precipitating-safes," our object being, first, to provide a construction in which the action can be maintained even while the precipitate is being removed, and, secondly, to provide a construction in which the precipitation can be carried on under pressure.

With these ends in view, and also to generally improve the construction of apparatus of this character, the invention consists in the various matters hereinafter described and claimed.

In the accompanying drawings, Figure 1 is an elevation, partly in section, of a safe containing our present invention; and Fig. 2 is a plan view of the grate.

Referring now more particularly to these drawings, X represents a pump by which the solution is fed into the safe through the supply-pipe X', said pipe being provided with a suitable check-valve, as x. It will of course be understood that although it has been found that the best results are obtained by forcing the solution into the safe, as by a pump, nevertheless it may be fed in any other suitable manner.

The safe itself comprises a vessel A, preferably cylindrical in cross-section, at a suitable point across which is located a grate B, here shown as held in position by the pins b b', projecting through the walls of the safe at the bottom and top of the grate, respectively. By this grate the main chamber A of the safe is divided into two compartments, the upper one of which A' is designed for the reception of zinc filings or similar material C for acting upon the solution containing the precious metal, while the lower compartment A^2 forms a compartment for the precipitate.

It will be noticed that the opening in the safe for the supply-pipe X' is below the grate B. Thus the solution is fed upwardly through the zinc or other material C, and the portion of said material resting upon the grate is the first to become corroded. This readily falls into the compartment A^2, and the fresher material is fed down by gravity to be in its turn corroded and deposited.

At a suitable point in the lower compartment and below the opening for the supply-pipe is located a gate D for dividing the lower compartment. Thus when a sufficient quantity of corroded zinc containing the precious metal has been deposited the gate D is closed, so that while the solution is still being fed into the safe above the gate and the corrosive action is continued the deposit may be readily removed from the compartment A^2 through the door a, the liquid having been previously discharged through the waste-cock a^2. In this deposit-compartment is also provided an outlet a^3, having a suitable cock a^4, by means of which the presence and quantity of the deposit can be indicated. Thus, if when the cock is opened the solution is clear, it shows that there is no deposit as high up as the cock. When, however, the cock discharges a thick solution, it shows that the deposit is full up to that point and that it is time to close the gate-valve D and empty the lower chamber. After the gate D is closed the cock a^3 is again opened to permit the entrance of air in order to facilitate the egress of the fluid through the waste-cock preparatory to the removal of the deposit. Returning to the gate D, this slides through an opening a^5 in the wall of the safe and is operated by a lever d, pivoted in a lug d' upon the wall of the safe and engaging the gate, as at d'. If preferred, the gate-valve can be made in a separate section of the safe A^3 and this section then bolted or otherwise secured in place to form the chamber A.

It has been found that in the operation of this class of apparatus better results are obtained if the metal-bearing solution is held in contact with the zinc or other material under pressure. To this end we have supplied a pressure device as follows: Upon suitable seats or lugs a^7, on the inner wall of the chamber A, rests a plate E, which practically closes

the chamber. This plate is located above the zinc filings, and thus exerts pressure upon the solution in the chamber. Of course the plate itself could be made of material heavy enough to exert the desired pressure, but in order that a light plate may be employed, and also that the degree of pressure may be regulated, a standard e is secured upon the top of the safe, and a lever e', carrying a weight e^2, is pivoted to said upright. A link e^3 connects the plate E to the lever e'. Thus by adjusting the location of the weight the pressure is regulated. Manifestly, should the pressure below the plate be sufficiently great the plate will be raised and the solution will rise above it. In order to provide for this, an outlet-pipe f, communicating with the compartment A' at a point above the plate, or, at least, above the seats a^7, communicates with an auxiliary settling-tank F, into which any overflow passes. This tank communicates, through a pipe f', with the deposit-compartment A^2, and in order to present no elbows in said pipe at which the deposit from the tank F could be caught, thus stopping the passage and causing a waste of precious metal, the lower portion of the compartment A^2 has an angular portion a^6, projecting under the tank F. Two valves f^2 f^3 are provided in the pipe f', the upper one of which, f^2, is normally open, thus allowing any deposit from the overflow solution in the tank F to settle upon the valve f^3. When it is desired to empty the deposit, the valve f^2 is closed, thus preventing a continuous flow through the pipe f', and the valve f^3 is opened to permit the deposit to discharge into the deposit-compartment A^2. After this discharge the lower valve is again closed and the upper valve opened. The auxiliary tank F is also provided with an overflow-pipe f^4, which in practice leads back to the vessel containing the clear solution to be pumped or otherwise fed into the safe, as before described.

From the foregoing it will be seen that the present construction is one in which the action of the apparatus is continuous, that the precipitation is carried on under pressure, and that there is no waste of solution from overflow or otherwise.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. An apparatus for separating metals from solutions containing them and for like purposes, said apparatus comprising a compartment for the operation of separation, a compartment for the deposition of the precipitate, said latter compartment being provided with an outlet and said compartments having communication one with the other, a grate in the passage of communication between the compartments, and means for closing the passage between the separating-compartment and the outlet in the compartment for the deposition of the precipitate at a point between said grate and said outlet; substantially as described.

2. An apparatus for separating metals from solutions containing them and for like purposes, said apparatus comprising a compartment for the operation of separation, a compartment for the deposition of the precipitate, said latter compartment being provided with an outlet and said compartments having communication one with the other, a grate in the passage of communication between the compartments, and a gate at a point between said grate and said outlet movable across the passage between the separating-compartment and the outlet in the compartment for the precipitate; substantially as described.

3. An apparatus for separating metals from solutions containing them and for like purposes, said apparatus comprising a compartment for the operation of separation, a compartment for the deposition of the precipitate, said latter compartment being provided with an outlet and said compartments having communication one with the other, a supply-pipe for feeding the solution to the separating-compartment, and means for closing the passage between the supply-pipe and the outlet in the compartment for the precipitate without causing a cessation of the supply of solution to the apparatus; substantially as described.

4. An apparatus for separating metals from solutions containing them and for like purposes, said apparatus comprising a compartment for the action of separation, a compartment thereunder and into which falls the deposition of the precipitate, said latter compartment being provided with an outlet and said compartments having communication one with the other, means for supplying the solution to the separating-compartment, means for closing the passage between the separating-compartment and the outlet in the compartment for the deposition of the precipitate, to permit removal of the precipitate, without interfering with the operation in the separating-compartment, and an outlet for the solution from the compartment for separation at the upper end thereof; substantially as described.

5. The combination with a closed vessel or stand-pipe, provided with a normally-closed outlet at its bottom for the precipitate, and having a body of zinc filings or like material held in its upper portion and adapted as corroded to fall into the lower part, of means for supplying the solution containing the precious metal to the lower end of the body of zinc filings or like material, to corrode the same and cause it to precipitate to the bottom of the vessel, the said body or column as such corroding or oxidizing action continues being adapted to slowly descend, to the place of such removal by corrosion, and present fresher portions for action by said solution, substantially as described.

6. The combination with a closed vessel or stand-pipe provided with a normally-closed outlet at its bottom for the precipitate and having a body or column of zinc filings or like material in its upper part, adapted as corroded to fall into the lower part, of means for supplying, under pressure, the solution containing the precious metal to the lower end of the said body or column of filings or like material, to cause the corrosion or oxidation thereof whereby such corroded or oxidized portions will gradually precipitate to the bottom of the vessel or stand-pipe and the fresher portions of the filings or like material be exposed to the ascending solution, substantially as described.

7. In an apparatus for separating metals from solutions containing them, and for like purposes, means for forcing the solution upon the lower portion of separating material under pressure, and means above said material and separate and independent of said forcing means for regulating the amount of said pressure; substantially as described.

8. In an apparatus for separating metals from solutions containing them and for like purposes, a compartment for the action of separation, means for supplying the solution to lower end of said compartment, a movable plate across the upper end of said compartment, and means for exerting pressure upon said plate in a direction opposite to the pressure of the solution; substantially as described.

9. In an apparatus for separating metals from solutions containing them and for like purposes, a compartment for the action of separation, a plate-seat in the upper end of said compartment, means below said seat for supplying the solution to said compartment, a movable plate across said compartment upon the upper side of said seat, and means for exerting pressure upon said plate toward its seat; substantially as described.

10. In an apparatus for separating metals from solutions containing them and for like purposes, a compartment for the action of separation, means for supplying the solution to said compartment from below, an outlet in the upper end of said compartment, and a yielding member closing said outlet to the passage of the solution, whereby when the solution reaches a given pressure the closing member will yield and allow said solution to discharge; substantially as described.

11. In an apparatus for separating metals from solutions containing them and for like purposes, a compartment for the action of separation, a movable plate across the upper end of said compartment, means for supplying the solution to the lower end of said compartment, means for exerting pressure upon said plate in a direction opposite to the pressure of the solution, and an outlet in said compartment beyond that face of the plate toward the solution-inlet; substantially as described.

12. In an apparatus for separating metals from solutions containing them and for like purposes, a compartment for the action of separation, means for supplying the solution to said compartment, an outlet in said compartment, a yielding member closing said outlet to the passage of the solution, whereby when the solution reaches a given pressure the closing member will yield and allow said solution to discharge, and a settling-chamber communicating with said outlet; substantially as described.

13. In an apparatus for separating metals from solutions containing them and for like purposes, a compartment for the deposition of the precipitate, a compartment for the action of separation, means for supplying the solution to said compartment, an outlet in said compartment, a yielding member closing said outlet to the passage of the solution, whereby when the solution reaches a given pressure the closing member will yield and allow said solution to discharge, a settling-chamber communicating with said outlet, and communication between said settling-chamber and the compartment for the deposition of the precipitate; substantially as described.

14. An apparatus for separating metals from solutions containing them, comprising a compartment for the operation of separation, a deposit-compartment communicating therewith, an auxiliary separating-chamber connected with the before-mentioned separating-chamber, a passage between the auxiliary separating-chamber and the deposit-compartment, and two valves in said passage; substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

PATRICK J. DONOHUE.
JOHN F. CORKER.

Witnesses:
GERTRUDE E. CORKER,
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