(No Model.)

J. L. STEWART.

APPARATUS FOR AMALGAMATING.

No. 262,628. Patented Aug. 15, 1882.

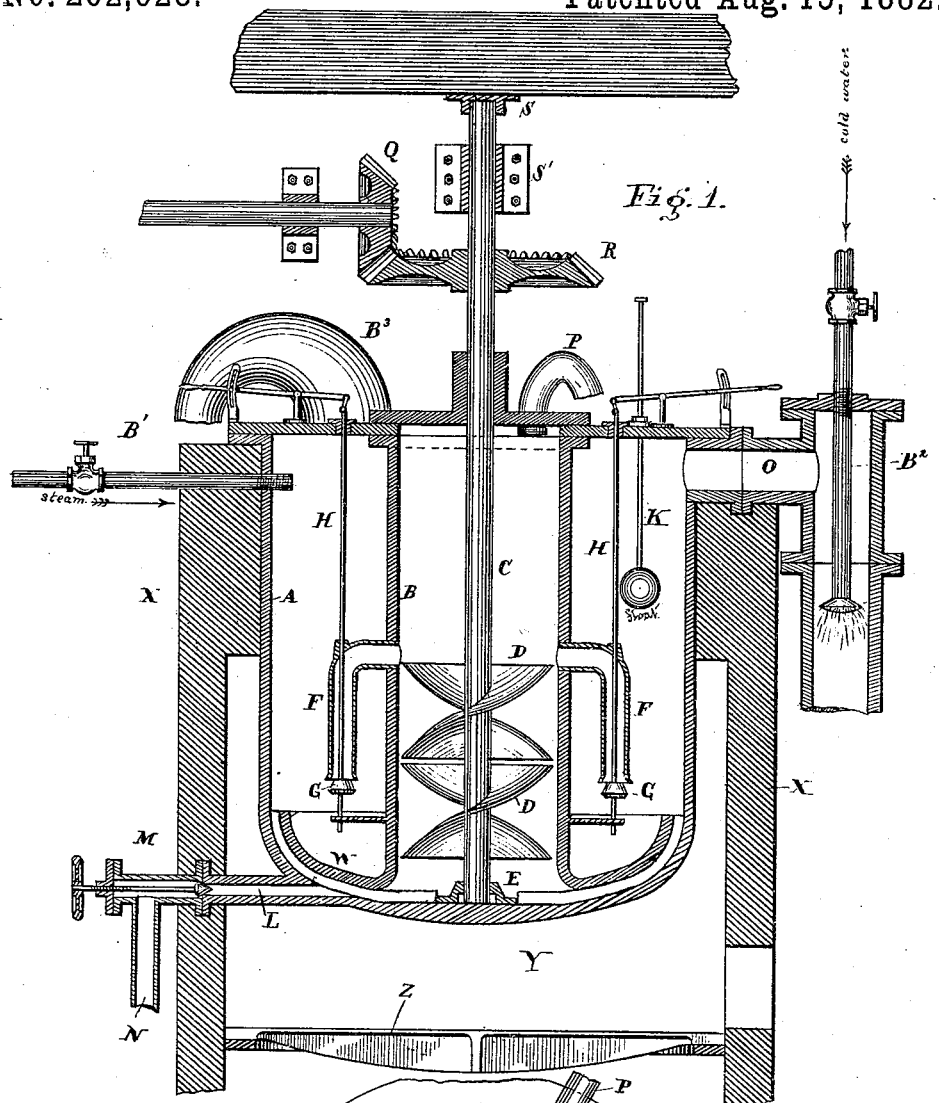

Fig. 1.

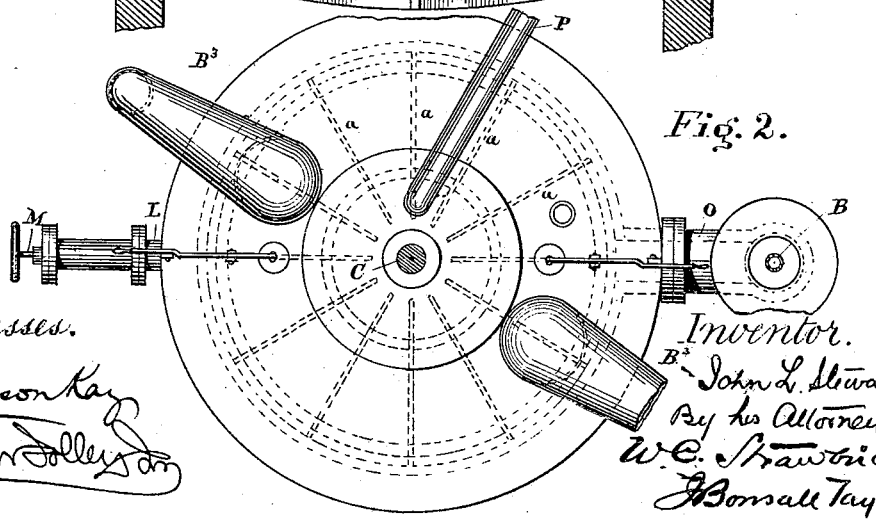

Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

JOHN L. STEWART, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR AMALGAMATING.

SPECIFICATION forming part of Letters Patent No. 262,628, dated August 15, 1882.

Application filed December 24, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. STEWART, of the city of Philadelphia, in the State of Pennsylvania, have invented an Improvement in the Apparatus for Amalgamating Precious Metals, of which the following is a specification.

The object of my invention is to provide means whereby precious metals contained in ore may be brought into more intimate and thorough contact with the amalgamating-bath than has heretofore been possible, with the result that the process of amalgamation may be more rapidly, cheaply, and efficiently carried on than by the processes heretofore in use.

My invention consists as hereinafter described and claimed.

In the drawings, Figure 1 is a vertical central sectional view of an apparatus conveniently embodying my invention. Fig. 2 is a plan view of said apparatus, partially sectional to illustrate construction.

Similar letters of reference indicate corresponding parts.

A is an iron pot or vessel, having a concave bottom, and supported upon brick-work X.

B is a cylindrical vessel located within the vessel A, attached to and suspended from the top thereof, and provided with a lower cup-shaped or expanding and flaring end, W, which forms a false bottom to the vessel A. This false bottom W is located some distance above the bottom of the exterior vessel, A, so as to leave a space between it and the bottom of said exterior vessel, with the result that material forced from the lower end of the vessel B into the vessel A is brought into close contact with the heated bottom of the last-named vessel. The false bottom is on its under side provided with radially-extending ribs *a a a*, which serve to form channels or outlets from the vessel B to the exterior vessel, A.

P is a pipe through which ore is fed to the vessel B.

F F are pipes leading outwardly from the vessel B and downwardly toward the false bottom of the vessel A.

C is a shaft concentric within the vessel B, provided with helical or propeller blades D D at a point flush with or below the lower edge of the openings into the pipes F F. This shaft rests in and upon a bearing, E, upon the bottom of the vessel A, which bearing is formed with ports or outlets at its lower end, that sand or other extraneous matter may escape if under any circumstances it should find its way therein. The upper portion of the shaft revolves within a bearing, S′, which may be attached to a bracket or other suitable support. The upper extremity of the shaft plays within an abutting bearing, which prevents the propellers from forcing the shaft upward and out of proper adjustment. This shaft may be driven by gearing Q R, of the usual construction.

The pipes F F are provided with valves G G, adapted to be operated by valve-stems H H, or by any suitable means.

L is a pipe or conduit connected with and leading from the true bottom of the vessel A, by which the liquid contents of said vessel may be drawn off, and through the pipe N discharged into any suitable receptacle.

B^3 is a gangue or débris escape or overflow pipe, and O is a débris or gangue outlet pipe, extending outwardly and downwardly from the upper portion of the vessel A, and provided with an injection-pipe, B^2, having a rose, by which water may be mixed with the escaping gangue or débris for the purpose of preparing the same for wet concentration should the latter process be found necessary.

B′ is a steam feed-pipe opening into the upper portion of the vessel A.

K is a float or indicator to determine the height of the fluid mass within the vessel A.

Y is a furnace, and Z grate-bars thereof.

I do not confine myself to the exact construction and detail of parts shown and described, as it is obvious that the same may be departed from without changing the character of my apparatus or modifying my invention.

Having thus described a convenient form of apparatus, its operation is as follows: The vessel A is filled with molten lead, mercury, or other amalgamating material to a point somewhat above the level of the upper edge of the openings of the pipes F F from the vessel B, within which latter vessel the material finds its level. When molten lead is employed as the amalgamating-bath sufficient heat is supplied and maintained, by means of a fire in the furnace Y or by means

of any suitable hot-air or superheated-steam heating device, to amalgamate the precious metals contained in the ore to be treated after the latter has been brought into contact therewith in the vessels A and B. The propellers D D are then operated at sufficient speed to force or propel the amalgamating-liquid in the interior chamber, B, downwardly through the same and outwardly between the ribs *a a* into the chamber A until the level of the amalgamating-bath in the vessel B is below the level of the lower edges of the respective openings into the pipes F F. The valves G G are then opened sufficiently to permit the proper quantity of amalgamating-liquid to flow from the vessel A back into the vessel B of its own gravity in order to obtain the desired rapidity of circulation of the liquid from the vessel A through the tubes F F and cylinder B. Ore containing the precious metals which has been previously prepared for dry amalgamation is now fed through the tube P in proper quantities to the amalgamating-chamber B, where it is brought into contact with the propellers D D and with the molten lead or other amalgamating-bath, and where it is retained for a longer or shorter time, at the pleasure of the operator.

By proper adjustment of the valves G G a greater or less quantity of material may be permitted to flow through the pipes F F into the amalgamating-chamber B.

It will be observed that the circulation of the liquid and the length of time that the ore is subjected to the action of the propellers and the molten material are both under the complete control of the operator. The ore, being of much less specific gravity than the molten lead, will, when immersed therein, tend to rise rapidly to the surface, and as the propeller is set vertically in the chamber B, the ore being forced through the lead will be continually rising and being pressed against the blades of the screw-propeller, by which it will be subjected to a grinding process between the molten lead and said blades. The propellers, being rapidly revolved, cause a thorough incorporation of every particle of the precious metals with the amalgamating-bath. The faces of the propeller-blades may be provided with ribs or rough projections, so as to increase their agitating and grinding action. It will thus be seen that the ore and molten lead, upon being admitted to the amalgamating-chamber B, are subjected to a thorough incorporation, and are then forced down through the chamber B into and through the superheated channels between the bottom of the vessel A and the under surface of the false bottom W into the vessel A, where the gangue or débris rises and flows out through the pipe O by reason of the difference in gravity between the lead and said débris.

The débris may be forced out of the vessel A, if necessary, by means of an air or steam jet admitted to the said vessel through the pipe B′, and be conducted through the pipe O to a concentrator, or to the waste-pile, as may be deemed proper.

In case of scarcity of water for supplying the water-feed B^2 the gangue or débris may be allowed to overflow and escape from the vessel A through the overflow-pipes B^3.

When quicksilver is employed as the amalgamating-bath the ore may be either wet or dry, and the quicksilver may be used cold, or it may be heated if the temperature is kept below the point of distillation.

Having thus described my invention, I claim—

In a device for amalgamating precious metals, an exterior pot or vessel, in combination with the interior cylinder, B, provided with an outwardly and upwardly flaring end or flange, W, located above the bottom of said exterior vessel, and having openings and valves for controlling said openings for the return of the amalgam bath to said cylinder, as described, and for the purpose specified.

In testimony whereof I have hereunto signed my name this 20th day of December, A. D, 1881.

JOHN L. STEWART.

In presence of—
J. BONSALL TAYLOR,
W. C. STRAWBRIDGE.