

(No Model.)

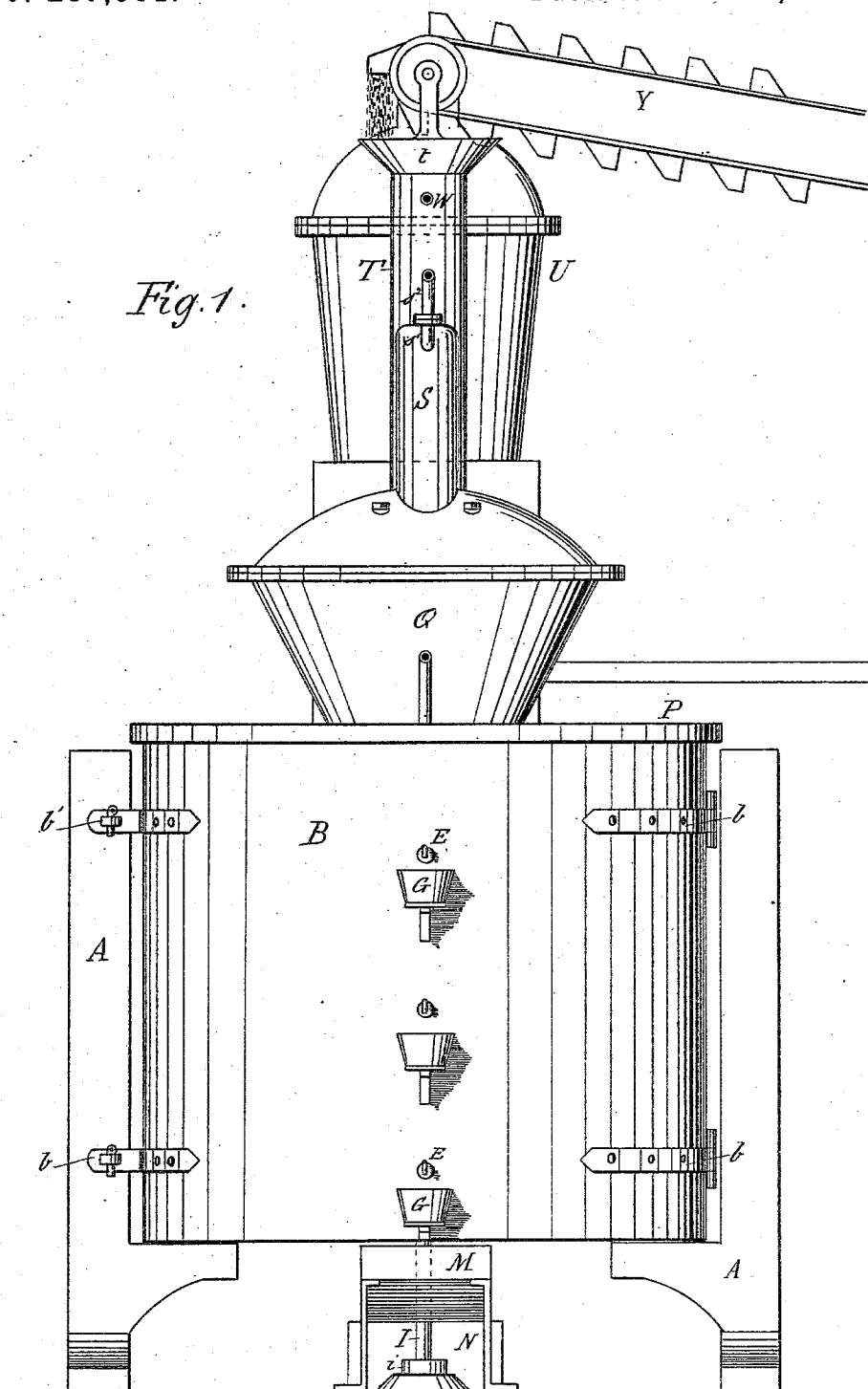
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C. E. TRIPLER.

PROCESS OF AND APPARATUS FOR AMALGAMATING ORES.

No. 287,981.

Patented Nov. 6, 1883.



Witnesses
Wm. A. Lowe
John Buckler

Inventor
Charles E. Tripler
By A. M. Dierck
att'y.

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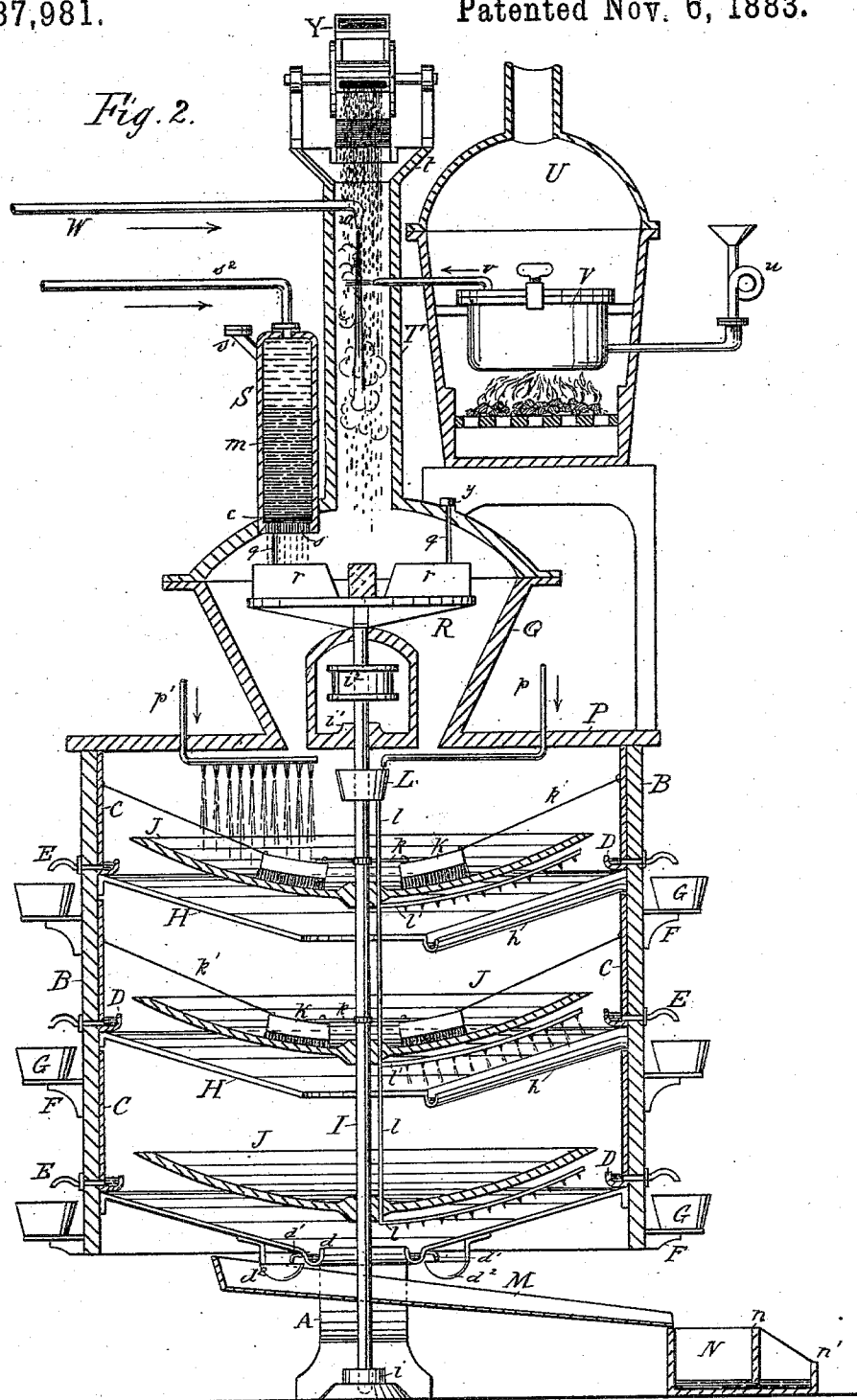
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UNITED STATES PATENT OFFICE.

CHARLES E. TRIPLER, OF NEW YORK, N. Y.

PROCESS OF AND APPARATUS FOR AMALGAMATING ORES.

SPECIFICATION forming part of Letters Patent No. 287,981, dated November 6, 1883.

Application filed March 12, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. TRIPLER, of the city, county, and State of New York, have invented certain new and useful Improvements in Process of and Apparatus for Amalgamating Ores, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates especially to mechanism and means for gathering precious metals from their ores by the aid of mercury, and has for its object the production of a device whereby the amalgamation may be quickly and easily accomplished and substantially the full chemical assay of the ore obtained.

To attain this end my invention consists, essentially, in a hopper, into which the finely-pulverized ore is conveyed by an elevator, or by other approved means. Upon falling into the hopper the ore first comes in contact with a jet of steam at low pressure and with vapor of mercury from a retort having communication with the conduit for the falling steam-saturated ore. The ore strikes a revolving disk, upon which are held adjustable blocks, constructed of suitable material, adapted and arranged to thoroughly mix the mass as it falls upon the disk, completely incorporating the ore and mercury. Over the disk is located a receptacle holding cold mercury, said receptacle being provided at bottom with perforations covered with leather, or equivalent material, through which the mercury is forced in a fine spray by means of hydraulic or other pressure applied to the receptacle, and this spray of mercury is also incorporated with the ore upon the revolving disk, assisting to gather the mercury already united with the ore in the form of vapor. The ore is thrown from the mixing-disk by centrifugal force, and falls upon a dished plate, preferably constructed of brass, and mounted upon the shaft below the mixing-disk. This plate is amalgamated, and revolves at a sufficient speed to throw the ore and mercury with considerable force against the sides of a jacket inclosing one or more of the amalgamated dishes or plates. Water is supplied to the upper dish, and brushes are supported upon its surface for mixing the water and ore, preventing an accumulation at any one point. One, two, three, or more dishes may be employed,

the ore passing from one to the other in its passage through the device. The sides of the jacket are made of or lined with metal, which may be amalgamated, (preferably brass,) and funnel-shaped divisions, constructed of the same material, are located beneath each revolving dish, said divisions being sectional and attached to the jacket. On the interior of the jacket, above each division-plate, is a small gutter, for the purpose of collecting the mercury and amalgam, each gutter being provided with a trap, through which the mercury flows to suitable receptacles upon the exterior of the jacket as fast as it gathers in the gutters. After the ore has passed over the various dishes and inclined division-plates it finds egress at the bottom of the device, where it falls into an inclined trough, which conducts it to a box, in the bottom whereof a quantity of mercury is placed. This box is divided by a partition extending downward to the mercury, and is so arranged that all the ore passes downward under the partition and through the mercury before it escapes, the object of such arrangement being to gather any of the amalgam of mercury that may possibly remain in the ore. In order to make a perfect amalgam, it is necessary that the particles of precious metal shall come in contact with mercury. The construction of my device is such that it is hardly possible for an atom of the metal to escape the influence of the mercury. The ore, in a finely-pulverized form, passing through the vapor of mercury, becomes completely coated with it, after which the spray of cold mercury gathers it in palpable form, retaining the fine particles of precious metal. The amalgamated brass plates not only attract both gold and silver, but also the mercury, by which means the mercury containing the amalgam is rapidly gathered, and in a fraction of the time heretofore required by any of the known means. By the use of my device there is no perceptible loss of mercury, and repeated tests under varied circumstances and conditions of ore have shown that substantially the full chemical assay of the ore has been obtained. The use of brass as a basis for the amalgamated dishes and plates I have found to be of the greatest utility, as this alloy easily amalgamates, and possesses many advantages over copper or silver. With my device but little attention is necessary, it be-

ing nearly automatic in operation, and when the mercury containing the amalgam is collected it is passed through canvas or chamois-skin, extracting the amalgam, and leaving the mercury ready to return to the retort or receptacle, requiring but a limited quantity for continuous use.

In the drawings, Figure 1 is a view in elevation of my improved amalgamator, and Fig. 2 is a vertical axial sectional view thereof.

Like letters of reference, wherever they occur, indicate corresponding parts in both figures.

A is the main frame, constructed of any substantial material.

B is a cylindrical jacket, divided into two parts, adapted and arranged to swing outward when it is desired to reach the interior of the device. This jacket may be made of boiler-iron, each portion being supported upon heavy hinges *b*. *b'* are fastenings for holding the jacket securely in place when closed. Attached to the interior of the jacket are brass plates C, amalgamated with mercury when in use. Within the jacket, beneath each plate C, are located gutters or troughs D, from whence a pipe, E, bent in such a manner as to form a trap, leads through the jacket to the exterior thereof, terminating over a shelf or bracket designed to support a receptacle, G. Within the jacket, just below each gutter, is secured a sloping division-plate, H, constructed of brass, and amalgamated when the device is in use. In order that the two portions of the jacket may be opened, and in swinging outward bring the division-plates with them, said plates are made in two parts, one half being attached to each portion of the jacket.

h is a trough attached to one edge of the division-plate, in such a manner as to extend beneath the opening between the parts when they are closed together, catching any ore, &c., which finds its way therethrough, and conveying it to the center of the device. It will be observed that the divisions are funnel-shaped, so that all substances falling thereon will find their way toward the center, dropping through the opening in the divisions.

I is an upright shaft journaled at *i* *i'*, and passing vertically through the device.

J are dished plates, constructed of brass, and secured to shaft I between divisions H. I have found, after exhaustive experiment, that brass is superior to any other material for this purpose, as it is readily amalgamated, and will retain the amalgam without frequent renewing, as is necessary when copper or silver plates are used, and the brass plate will wear for a much longer period than either of said metals. Owing to the components of the alloy, it has a great affinity for both gold and silver. By giving the plates a dished shape the ore and amalgam, in passing to the periphery, is compelled to go up an incline, which effectually forces all the particles of precious metal and mercury against the amalgam of the dishes, materially assisting in the gathering process.

K are brushes, constructed of any suitable material, secured to a ring, *k*, and resting upon the pans, said brushes being held in proper position by wires *k'*, extending to the sides of the jacket.

L is a cup affixed to shaft D, and having a tube or pipe, *l*, extending therefrom to the bottom of the device, and provided with branch pipes *l'*, having spray-openings, and extending outward beneath each pan, for the purpose of conveying and distributing water to and upon the fixed divisions H. The lower division, H, is provided with a gutter, *d*, extending therearound, and communicating, by means of traps *d'*, with receptacles *d''*. Beneath the opening in the center of said division-plate is located a sloping trough, M, leading to a box, N, having a division or partition, *n*, extending thereacross and nearly to the bottom of the box. Side *n'* of the box is made much lower than the partition.

Jacket B is surmounted by a top plate, P, perforated for the passage of a pipe, *p*, for conveying water to pipe L, and for the passage of a pipe, *p'*, for conveying water in a spray over the upper dish, J. Upon cover P is located a box or case, Q, into which shaft I extends, an opening being provided through said box, wherein a pulley, *i'*, is fixed upon shaft I, for the purpose of applying power to rotate the pans, &c. The upper extremity of shaft I is surmounted by a disk, R.

r are blocks, of wood or other suitable material, so located that they rest upon disk R, and are held in place by arms *q*, extending from the top of case Q. These arms are provided with a nut or set-screw, *y*, upon the exterior of case Q, whereby the pressure of the block upon disk R may be regulated.

S is a receptacle for mercury, mounted upon case Q. The bottom of receptacle S is provided with perforations *s*, over or in which leather, *c*, or equivalent material, is placed, through which the mercury, in the form of spray, may be forced by pressure.

s' is an orifice through which the receptacle may be filled, and *s''* is a pipe for applying hydraulic or other pressure to the mercury.

T is a pipe or conduit leading from case Q, and provided at its upper extremity with a hopper, *t*, into which pulverized ore may be dumped. In the present instance I have shown an elevator, Y, by which to supply the ore; but any desired means may be employed.

U is a furnace wherein is located a retort, V, for containing mercury, which may be supplied thereto through pipe *u*. From the retort a pipe, *v*, leads to conduit T.

W is a steam-pipe extending into conduit T, near the top thereof, and terminating in a nozzle, *w*, pointing down the conduit.

When constructed and arranged in accordance with the foregoing description, the operation of my improved amalgamator is as follows: After the dishes, plates, and divisions within the jacket have been amalgamated, sufficient mercury is placed in gutters D and

5 *d* to close the traps leading to the receptacles upon the exterior of the device. The bottom of box N is covered with mercury up to the partition. Water is supplied to pipes *p* and *p'*. Cold mercury is placed in receptacle S and pressure applied thereto. Mercury is also supplied to retort V, and fire is started thereunder to vaporize the mercury. A jet of steam at low pressure is thrown down conduit T, power is applied to the rotating mechanism within the device, and finely-powdered ore is dumped gradually into the top of the conduit. The falling ore first strikes the steam, becoming saturated therewith, the saturated mass passes into the vapor of mercury, escaping from pipe *v*, and said vapor attacks the particles of precious metal contained in the ore, and is carried down with it, the mass falling upon disk R. The cold spray of mercury is continually falling upon said disk R, and is thoroughly incorporated with the mass by grinding between disk R and blocks *r*. The disk is made to rotate with sufficient speed to throw the ore and amalgam off, when it falls down upon the first rotating dish, J, and is thoroughly mixed with the water falling on said dish by the brushes, which prevent the ore gathering and leaving the dish in masses. The ore and amalgam are gradually carried toward the periphery of the dish by centrifugal force, and are so thoroughly mixed that each particle of metal comes in contact with the mercury and becomes amalgamated in such a manner that when it is thrown off of the dish it strikes the jacket-plates C and passes down into gutter D. Being of greater specific gravity, the amalgam passes through the ore and strikes said plate, dropping to the bottom of gutter D, very little escaping down the division-plate H. The ore next passes down the first division-plate, water being sprinkled thereon from spray *l'*, and, falling onto the second dish, the above operation is repeated. When the ore falls into trough M at the base of the device, very little, if any, precious metal and mercury remains therein; but to guard against possible loss, the tailings are all conducted to box N, where they are compelled to pass through the mercury under partition *n* and over the side *n'* of the box. Three dishes are shown in my present device; but a greater or less number might be employed, as found necessary, the operation being the same.

55 Having now fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

60 1. The herein-described method of amalgamating precious metals—that is to say, by first passing finely-powdered ore through steam at low pressure and through vapor of mercury, then mixing the mass with cold mercury and water, and passing it over revolving amalgamated dishes inclosed within an amalgamated jacket, substantially as shown and described.

65 2. In an amalgamator of the character herein specified, the combination, with a vertical rotatory shaft bearing dish-shaped pans, as

set forth, of a vertical stationary jacket surrounding said pans, the inner surface of said jacket being amalgamated, and provided with means adapted and arranged to receive and collect the amalgam thrown from the pans, substantially as shown and described.

3. In an amalgamator of the character herein specified, a stationary vertical jacket composed of or lined with amalgamable metal, and provided with means adapted and arranged to collect amalgam and convey it to the exterior of the jacket, substantially as shown and described.

4. In an amalgamator, a closed receptacle for mercury, the bottom of said receptacle being perforated, as set forth, a false bottom, of leather or equivalent material, being located thereabove, and means being provided for applying pressure to the receptacle, substantially as and for the uses and purposes shown and described.

5. The combination, with a revolving mixing-disk, of a receptacle for mercury, the bottom of said receptacle being perforated, as set forth, and having a false bottom thereabove, constructed of material provided with natural pores, through which the mercury may be forced by pressure applied to the receptacle, substantially as shown and described.

6. In an amalgamator of the character herein specified, the combination, with an ore-conduit, of a mercury-vaporizing retort, a cold-mercury receptacle, and a steam-jet, substantially as shown and described.

7. The combination, with disk R, inclosed within case Q, of blocks *r*, secured in place by adjustable arms *q*, and mercury-spraying device S, constructed and arranged to operate substantially as shown and described.

8. The combination, with revolving dishes J, of brushes K, secured to a ring, *k*, and held against revolving with the supporting-dish by wires *k'*, substantially as shown and described.

9. In an amalgamator of the character herein specified, the combination, with jacket B, supporting division-plates H, of the device for spraying water upon said plates, substantially as shown and described.

10. A jacket constructed of or lined with amalgamated metal, as set forth, and provided with gutters or troughs having outlets upon the exterior of the jacket, substantially as and for the uses and purposes set forth.

11. The combination, with vertical shaft I, of disk R, pans J, plates H, and tube *l*, bearing perforated arms *l'*, substantially as set forth.

12. The combination, with separable jacket B, of troughs or gutters D and divisions H, substantially as shown and described.

13. The combination, with division-plates H, of troughs *h'*, located beneath the plates at the separating points, substantially as and for the uses and purposes shown and described.

14. In an amalgamator, a conduit for powdered ore, a steam-jet located in said conduit,

a mercury-vaporizing retort, a mercury-spraying device, a revolving mixing-disk, revolving dish-shaped amalgamated pans, surrounded by an amalgamated jacket, whereon are located
5 troughs or gutters, and to which division-plates are affixed, and a box through which the tailings pass, the whole combined and arranged to operate substantially as shown and described.

In testimony that I claim the foregoing I do have hereunto set my hand in the presence of two witnesses.

CHARLES E. TRIPLER.

Witnesses:

EUGENE N. ELIOT,
A. M. PIERCE.