(No Model.)

W. A. THACHER.

ART OF AND APPARATUS FOR AMALGAMATING.

No. 590,504. Patented Sept. 21, 1897.

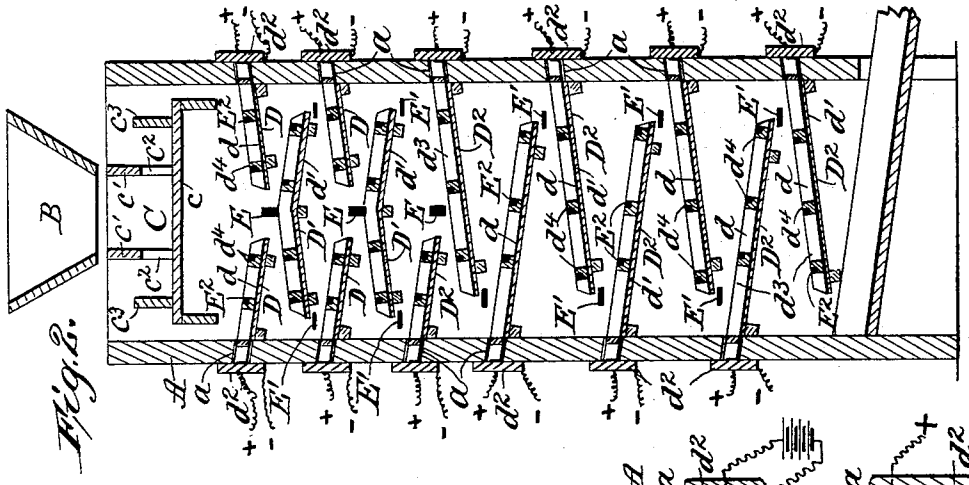


Fig. 2.

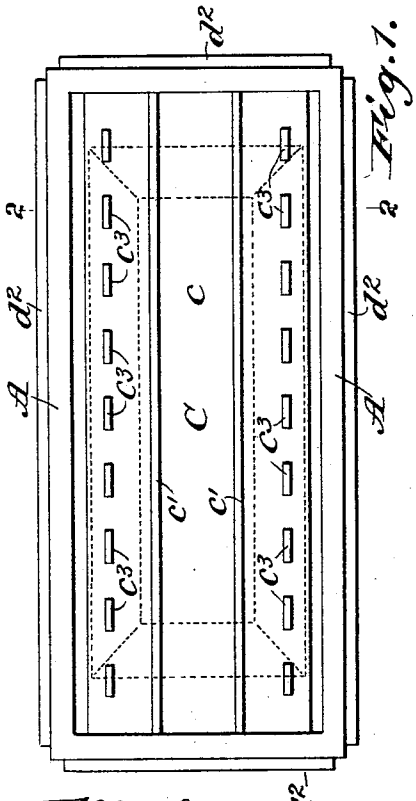


Fig. 1.

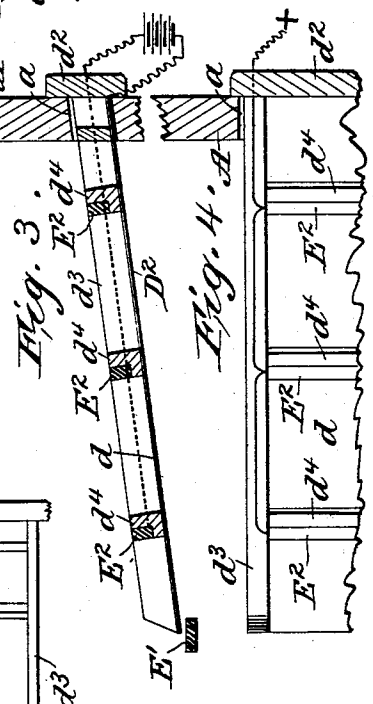


Fig. 3.

Fig. 4.

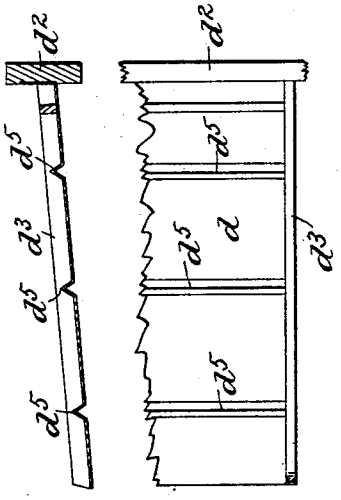


Fig. 5.

Witnesses
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM A. THACHER, OF NEW YORK, N. Y.

ART OF AND APPARATUS FOR AMALGAMATING.

SPECIFICATION forming part of Letters Patent No. 590,504, dated September 21, 1897.

Application filed March 3, 1897. Serial No. 625,820. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. THACHER, a citizen of the United States, residing in the city and county of New York, in the State of New York, have invented certain new and useful Improvements in the Art of and Apparatus for Amalgamating, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

The object of this invention is to provide an improved process of and apparatus for amalgamating gold and silver, and especially for treating black sand, tailings, &c., which have generally been found to give returns too poor to cover the expense of working.

The main object of my invention has been to enable the extraction of gold from black sand to be accomplished successfully and economically.

A further object has been to reduce the apparatus to as small a compass as possible while insuring the practically complete amalgamation of all of the metal contained in the black sand, tailings, &c.

Another object has been to enable the operation of the apparatus to be continuous—that is to say, to avoid the stopping of the operation for the purpose of cleaning up.

A further object has been to permit the electric current in electric amalgamators to be applied at will or in different degrees of strength to different parts for the purpose of operating to better advantage upon the material to be treated.

Other features of improvement will be set forth hereinafter.

In the accompanying drawings, wherein, for the purpose of explaining the nature of my invention, I have illustrated certain convenient and practical forms of my improved apparatus, Figure 1 is a plan view of one form of the apparatus with the tom-box or hopper indicated in dotted lines, so that the construction of the distributer below it may appear more clearly. Fig. 2 is a vertical section of the same on the plane indicated by the line 2 2 of Fig. 1. Figs. 3 and 4 are detail views, on a larger scale, in vertical and horizontal sections. Figs. 5 and 6 are detail views illustrating a slight modification.

In distinction from amalgamators of the ordinary form which usually comprise one or more long inclined tables and cover much space my improved apparatus is included within the walls of a vertical frame or casing A, which covers comparatively little ground but may rise to any desired height within reasonable limits, according to the nature of the material to be operated upon. At the top of the frame or casing is a tom-box or hopper B, of ordinary construction, into which the material to be treated is delivered with water from any suitable source. Below the tom-box or hopper is a distributer C, the purpose of which is to deliver the material with some degree of uniformity to all parts of the apparatus. As represented in the drawings, the distributer preferably comprises a substantially horizontal plate or table c, upon which rest walls c', having apertures c^2 at frequent intervals, and outside of the walls c' and near the edges of the board c, which does not extend from side to side of the box or casing, are narrow stops c^3, between which the material mixed with water escapes and falls over the edges of the plate c to the portions of the apparatus below.

Below the distributer are supported inclined plates which overlap so that the material shall run over each plate and fall from its lower edge to the plate beneath. These plates may be arranged as clearly shown in Fig. 2, in which the plates D D incline inward from each side to deliver the material through the space between them to a plate D′, which inclines outwardly in both directions to deliver the material to other plates D D, while in the lower portion of the apparatus the plates D^2 incline inwardly from opposite sides in alternation and extend nearly across the apparatus. Either one of these arrangements of the plates may be employed alone, if desired, and for convenience in removal of the plates the arrangement of the plates D^2, perhaps, may be preferred. Each one of the plates above referred to consists, preferably, of a sheet or plate of copper d, which is supported upon a wooden table d', upon which it can be moved freely in and out through a slot a in the side or end of the casing A. I prefer to secure each plate to a frame composed of an end bar d^2 and side bars d^3, which stiffens the plate and permits

it to be handled to better advantage when it is removed for the purpose of cleaning up. Transversely upon each plate d at suitable intervals I secure stop-bars d^4, which serve to check the rush of the material over the plate, thereby preventing the flouring of the quicksilver with which the plate is amalgamated and the erosion of the plate itself and also to cause the material to fall upon the plates in a series of small cataracts. As indicated in Fig. 3, each plate d is connected to an electric circuit and preferably constitutes the negative electrode. The other side of the circuit is connected to bars or plates of other material, such as iron, which are supported in proximity to the plates d d and constitute the positive electrodes, so that when the apparatus is in operation the electric current shall flow from the positive electrodes to the negative electrodes through the mingled water and material and either by decomposing the water or by setting up other chemical action shall set free gases which will attack the surface of the particles of metal and deoxidize or otherwise cleanse them so that when they strike the amalgamated plates d d they shall themselves be in condition to be amalgamated and held upon the plates. It is obvious that the positive electrodes may be arranged in various ways with respect to the plates d d even in a single apparatus, and in Fig. 2 I have shown a positive electrode E, between the ends of the plates D D and somewhat above the plate at D', in position to be struck by the mingled water and material as it flows from the plates at D D, and below each end of the plates, at D' and at D^2, I have shown a similar electrode E'. In each stop-bar d^4, which is preferably of wood soaked in paraffin to render it a good insulator, is set a bar E^2, of iron or other suitable material, to constitute a positive electrode. In this last-described arrangement the positive electrodes are perhaps in the most advantageous position with respect to the negative electrodes, especially when they are set in the edges of the stop-bars, as represented, since the mingled water and material flows directly over them and from them upon the negative electrode, thereby permitting the particles of metal to strike the latter just as they have been acted upon by the free gases and are therefore perfectly clean.

In the modification represented in Figs. 5 and 6 the stop-bars d^5 are formed by indenting the plate d from beneath, and such construction may be employed when the electrodes are disposed below the ends of the plates, as represented at E and E'.

As each plate d is entirely disconnected from the others and has its own electrical connections, as clearly represented in Figs. 2 and 3, it is not only possible to maintain the electrical action on certain plates while discontinuing it upon others, but it is also possible to employ currents of different degrees of strength in different parts of the amalgamator, and in the treatment of material by my improved process I employ upon the plates in the upper part of the box, where the material is first operated upon and where the particles of metal are most thoroughly incased in oxid, a more powerful current (usually a secondary current) than that employed upon the plates in the lower part of the box—that is to say, in practicing this part of my invention the material to be treated is subjected successively while passing over the amalgamating-surface to electric currents of different degrees of strength. It will be understood, of course, that this part of my invention is independent of the particular form of apparatus herein shown and described and can be practiced with other forms of apparatus.

The mode of operation of my improved apparatus will be readily understood from the foregoing description without further explanation except to say that each plate d can be removed separately whenever required for the purpose of cleaning up, without requiring the operation of the apparatus as a whole to be discontinued.

I claim as my invention—

1. An amalgamating apparatus provided with an inclined amalgamated bottom plate, riffle-forming electrodes disposed transversely upon and across said plate and insulated therefrom, whereby the material operated upon falls over the upper edges of said electrodes upon said amalgamating-plate, and an electric circuit having one side connected to the plate and the other to the series of riffle-forming electrodes; substantially as described.

2. An amalgamating apparatus having an inclined amalgamating-plate, stop-bars of insulating material disposed transversely upon said plate, electrodes set in said stop-bars, whereby the material operated upon falls over said electrodes upon said amalgamating-plate and an electric circuit having one side connected to said amalgamating-plate and the other side connected to said electrodes, substantially as shown and described.

3. The improvement in the art of amalgamating, which consists in mixing with water the material to be treated, passing the mingled water and material in a continuous stream over a series of electrodes, the negative electrodes of said series having amalgamated working faces and subjecting the water and material, in passage, to the action of electric currents of different degrees of strength at successive electrodes.

This specification signed and witnessed this 2d day of March, A. D. 1897.

WILLIAM A. THACHER.

In presence of—
CHARLES A. HITCHCOCK,
W. B. GREELEY.