(No Model.) 2 Sheets—Sheet 1.

W. HAMILTON.

APPARATUS FOR AMALGAMATING GOLD AND SILVER ORES.

No. 260,389. Patented July 4, 1882.

Fig: 1.

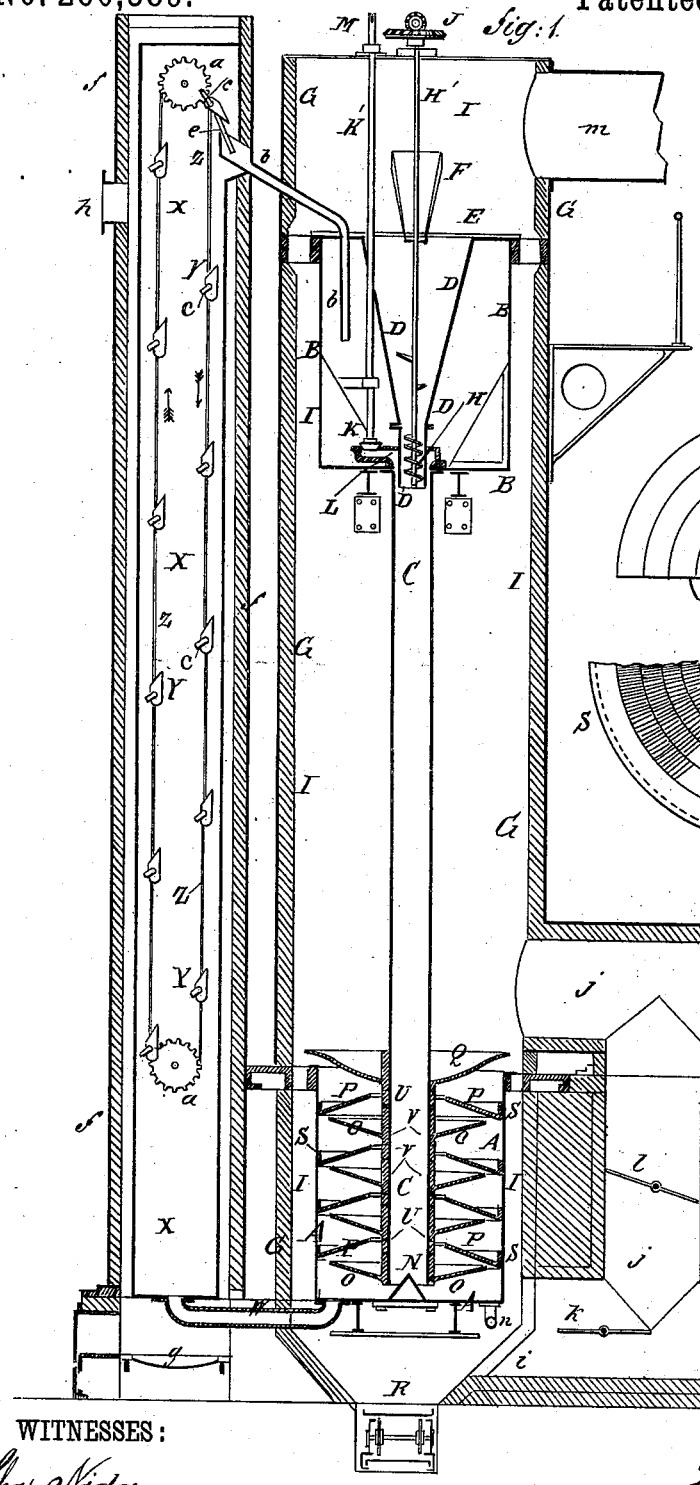


Fig: 2.

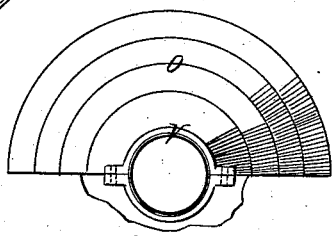
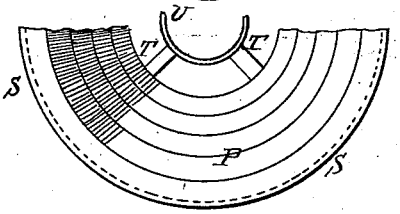


Fig: 3.



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

W. HAMILTON.

APPARATUS FOR AMALGAMATING GOLD AND SILVER ORES.

No. 260,389. Patented July 4, 1882.

Fig: 4.

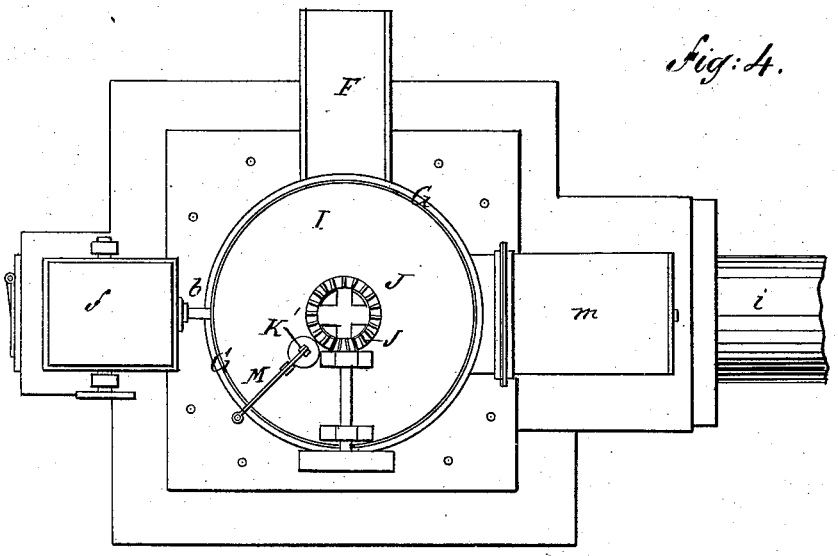


Fig: 5.

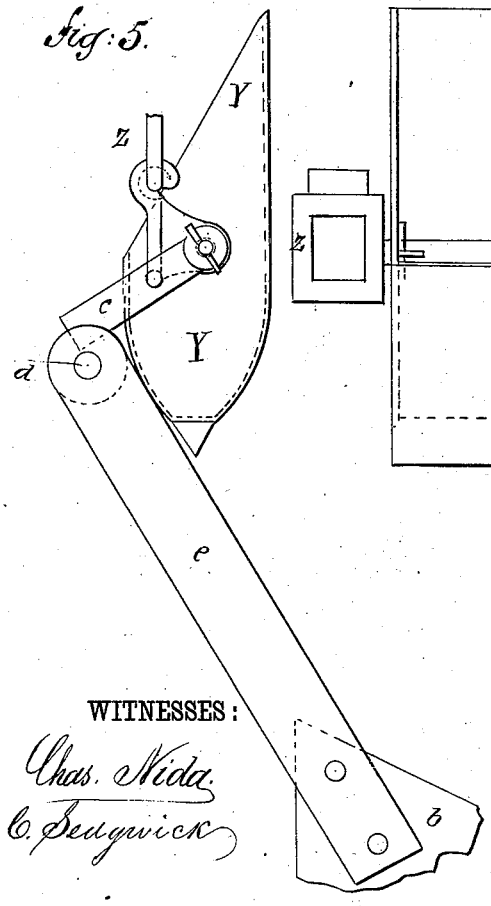
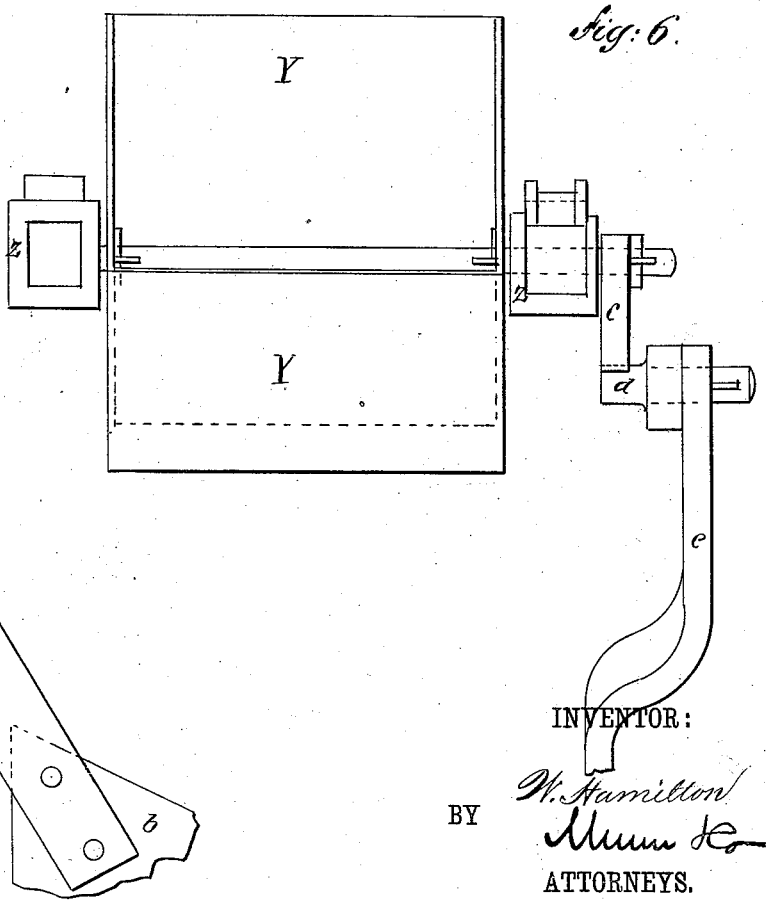


Fig: 6.



WITNESSES:

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UNITED STATES PATENT OFFICE.

WALTER HAMILTON, OF NEW YORK, N. Y.

APPARATUS FOR AMALGAMATING GOLD AND SILVER ORES.

SPECIFICATION forming part of Letters Patent No. 260,389, dated July 4, 1882.

Application filed November 8, 1881. (No model.)

To all whom it may concern:

Be it known that I, WALTER HAMILTON, of the city, county, and State of New York, have invented a new and Improved Apparatus for Amalgamating Gold and Silver Ores and other Substances, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1, Sheet 1, is a sectional side elevation of my improvement. Fig. 2, Sheet 1, is a bottom view of a part of one of the flaring distributing-plates. Fig. 3, Sheet 1, is a bottom view of a part of one of the tapering distributing-plates. Fig. 4, Sheet 2, is a plan view of the improvement. Fig. 5, Sheet 2, is a side elevation of the bucket-tripping mechanism. Fig. 6, Sheet 2, is a plan view of the same.

The object of this invention is to facilitate the amalgamation of gold, silver, and other substances.

The invention consists in an apparatus for amalgamating gold and silver ores, constructed with two vessels, placed one above the other, and connected by a pipe for the passage of the amalgamating substance from the upper to the lower vessel, an elevator for raising the amalgamating substance from the lower to the upper vessel, a furnace to keep the amalgamating substance molten, a funnel for introducing the ore into the descending column of the amalgamating substance, a valve to regulate the descent of the amalgamating substance, and peculiarly-constructed plates for distributing the ore through the amalgamating substance and removing the refuse, as will be hereinafter fully described, and pointed out in the claims.

A represents a vessel of sufficient size to contain ten tons (more or less) of molten lead or other metal or composition of metals capable of amalgamating gold and silver. At a suitable distance above the vessel A is placed a corresponding vessel, B. From an aperture in the bottom of the vessel B a vertical pipe, C, leads down into the vessel A and extends nearly to the bottom of the said vessel A.

Within the vessel B is placed a funnel, D, the lower part of which extends down concentrically through the upper part of the vertical pipe C. The funnel D is suspended by a bridge, E, or other suitable means from the rim of the vessel B or other suitable support. The ore from which the metal is to be amalgamated is introduced into the funnel D through an inclined spout or chute, F, passing in through the wall G, that surrounds the vessels A B, and their connecting-pipe C. The pulverized ore can be fed into the chute F by a screw or other suitable means, which feed mechanism is not shown in the drawings.

Within the lower tubular part of the funnel D is placed a feed-screw, H, the shaft H′ of which passes up through the top or cover of the chamber I, that contains the vessels A B and pipe C, and is driven by gear-wheels J or other suitable means from a steam-engine or other convenient power. The screw H forces the pulverized ore down through the funnel D in uniform quantities. With this construction, as the molten lead descends through the pipe C from the vessel B to the vessel A, it tends to form a vacuum at the lower end of the funnel D, and thus carries the ore with it into the said lower vessel, A.

The rapidity of descent of the molten lead, and consequently of the ore, is regulated by a valve, K, placed in the upper end of the spout L, that conducts the molten lead from the upper vessel, B, into the ring-space in the upper part of the pipe C, around the lower part of the funnel D. The stem K′ of the valve K passes up through the top or cover of the chamber I, and is connected with a lever, M, or other suitable means for operating the said valve K.

To the bottom of the lower vessel, A, directly beneath the lower end of the pipe C, is secured a cone, N, of metal or other suitable material, the apex of which projects centrally into the lower end of the said pipe C, as shown in Fig. 1, so as to divide the descending stream of ore and molten lead and distribute it equally to all parts of the vessel A. As the ore escapes from the lower end of the pipe C it rises through the molten lead in the vessel A and passes outwardly along the lower surface of the outwardly and upwardly inclined ring-plate O. The ore escapes around the outer edge of the plate O, and, rising, comes in contact with and passes inward and upward along

the lower surface of the inwardly and upwardly inclined plate P. The ore escapes around the inner edge of the plate P, rises to and passes outward along the lower surface of another plate O, and so on through a series of any desired number of plates. As the ore rises around the inner surface of the last plate P of the series it comes in contact with the lower surface of the dish-shaped plate Q, and passes upward and outward along the said surface until it falls over the rim of the vessel A into the lower part of the chamber I, whence it is removed as refuse by a carrier, R, or other suitable means. The lower surfaces of the plates O P are divided into ring-spaces, and the said spaces are grooved radially, as shown in Fig. 2, so that the ore will be expanded or spread as it passes outward along the flaring plates O, and contracted as it passes inward along the tapered plates P. The outer edges of the plates P have upwardly-projecting flanges S formed along them, which fit against and are firmly bolted to the sides of the vessel A. The inner edges of the plates P are connected by radial arms T with a collar, U, which fits upon the pipe C, so that the said plates P will be firmly held against the upward pressure of the molten lead and the ore. The inner edges of the plates O have collars V formed upon them, which fit upon the pipe C between the collars U of the plates P, so that the plates O will be held against the upward pressure of the molten lead and the ore by the plates P.

The lower plate O and its collar V, or all the plates O and their collars, can be made in two parts, as shown in Fig. 2, and bolted or riveted around the pipe C, an asbestus packing being interposed between the said collar and pipe to make a firm connection. By this construction every particle of the pulverized ore will be brought into contact with the molten lead, so that all the gold or silver will be removed. The molten lead from the vessel A flows through a pipe, W, into the lower end of an elevator-well, X, and is raised by an endless chain of buckets, Y, the chains Z of which pass around chain-wheels *a*, pivoted to the walls of the said elevator-well. As the buckets Y pass over the upper chain-wheels *a* their contents are dumped into the enlarged upper end of a pipe, *b*, which passes into the chamber I and extends down into the upper vessel, B, so that its lower end will be below the surface of the molten lead in the said vessel.

To the side of each bucket Y is attached an arm, *c*, which, as the said bucket passes over the upper chain-wheels *a*, comes in contact with an arm, *d*, attached to the upper end of a bar, *e*, so that the said bucket will be tilted and will discharge its contents into the pipe *b*. The lower end of the bar *e* can be attached to the side of the upper end of the pipe *b*, or to some other suitable support.

The well X is placed within a stack, *f*, of a larger interior diameter than the exterior diameter of the said well, so that there will be a space all around the said well for the passage of the products of combustion from the furnace *g*, placed beneath the said well X, to keep the lead molten while being carried up the elevator. The products of combustion pass from the stack *f* into a flue, *h*, by which they are conducted into the smoke-stack, which is not shown in the drawings. The lead in the vessels A B and pipe C is melted and kept molten by the products of combustion which pass into the lower part of the chamber I, below the vessel A, through a flue, *i*, leading from a large furnace, which is not shown in the drawings, but which is constructed in the ordinary manner. The flue *i* is made with a branch flue, *j*, leading into the chamber I above the vessel A. The flues *i j* are provided with dampers *k l*, so that the products of combustion can be sent through the flue *i* or through the flue *j*, or partly through each flue, as may be required. The products of combustion pass from the chamber I into the smoke-stack through the flue *m*. When the molten lead has taken up as much of the gold or silver as it readily will it is drawn off through a discharge-pipe, *n*, and a fresh supply of lead is put into the vessel B to be melted and used.

I am aware that it is not broadly new to use an elevator in an amalgamator, the same having been used for conveying the quicksilver from a tank below the tub containing the ore to a tank above the tub, from whence it flows into the said tub, and I therefore do not claim such; but

What I do claim, and desire to secure by Letters Patent, is—

1. In an apparatus for amalgamating gold and silver ores, the distributing-plates O P, having their lower sides divided into ring-spaces and grooved radially, substantially as herein shown and described, whereby the ore will be spread as it passes outward, and drawn together as it passes inward, as set forth.

2. The combination of the radially-grooved plates O P, substantially as herein shown and described, whereby the material is alternately spread and condensed by the radial grooves, as set forth.

3. In an apparatus for amalgamating gold and silver ores, the combination, with the lower vessel, A, and the pipe C, of the distributing-plates O P, having their lower sides divided into ring-sections and grooved radially, as set forth.

4. In an apparatus for amalgamating gold and silver ores, the combination, with the lower vessel, A, the pipe C, and the distributing-plates O P, of the dish-shaped plate Q, substantially as herein shown and described, whereby the refuse is removed from the said vessel, as set forth.

5. In an apparatus for amalgamating gold and silver ores, the combination, with the upper vessel, B, the pipe C, and the ore-funnel D, of the valve K and spout L, substantially

as herein shown and described, whereby the descent of the lead can be regulated, as set forth.

6. In an apparatus for amalgamating gold and silver ores, the combination, with the vessels A B, the elevator Y Z, and the furnace-stack *f*, of the elevator-well X, placed in the said stack, and communicating with the said vessels by the pipes *b* W, substantially as and for the purpose set forth.

WALTER HAMILTON.

Witnesses:

JAMES T. GRAHAM,

C. SEDGWICK.