I. M PHELPS.

Ore Amalgamator.

No. 200,335. Patented Feb. 12, 1878.

Fig. 2.

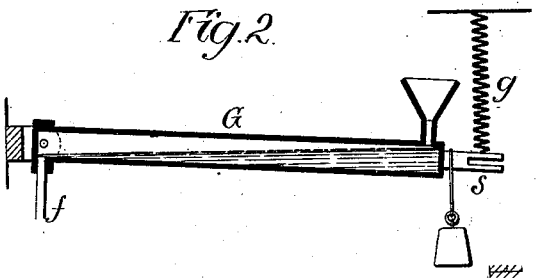


Fig. 3.

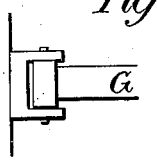


Fig. 1.

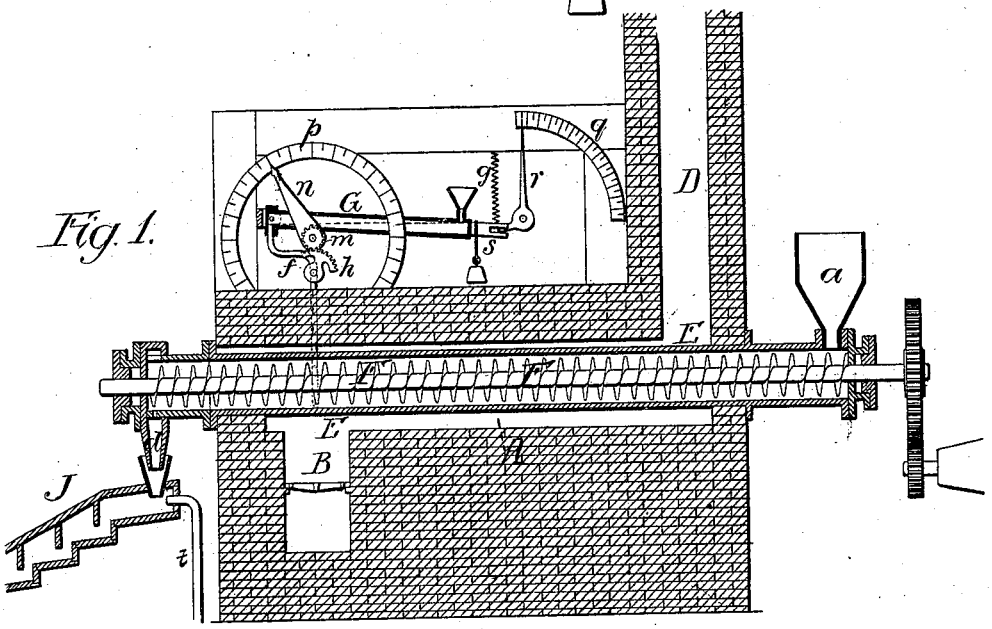


Fig. 4.

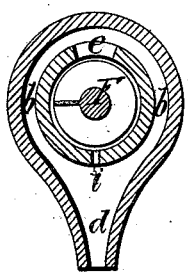
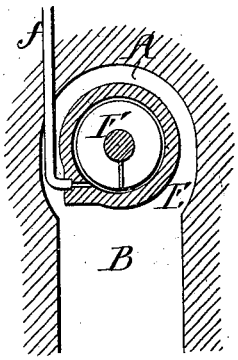


Fig. 5.



Witnesses

John M. Beemer

Harry Smith

Inventor

Ira M. Phelps

by his Attorneys

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UNITED STATES PATENT OFFICE.

IRA M. PHELPS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF A PART OF HIS RIGHT TO THEODORE L. CHASE AND H. J. FILLMAN, OF SAME PLACE, AND D. K. ALLEN, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ORE-AMALGAMATORS.

Specification forming part of Letters Patent No. **200,335**, dated February 12, 1878; application filed November 8, 1877.

To all whom it may concern:

Be it known that I, IRA M. PHELPS, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Amalgamating Apparatus, of which the following is a specification:

The object of my invention is to effect the thorough amalgamation of gold or silver bearing ores—an object which I attain in the following manner, reference being had to the accompanying drawing, in which—

Figure 1 is a vertical section of my improved amalgamating apparatus; and Figs. 2, 3, 4, and 5, views of parts of the apparatus drawn to an enlarged scale.

A is the main flue or chamber of a furnace, of which B is the fire-place, and D the chimney.

Through the furnace extends a retort, E, which projects at each end from the furnace-wall, and is provided with a screw-conveyer, F, driven by any suitable system of gearing.

The receiving end of the retort is provided with a hopper, *a*, and the discharge end is surrounded by a casing inclosing an annular chamber, *b*, which communicates with a discharge-opening, *d*, and also with the interior of the retort, through a large opening, *e*, at the top of the same, and a small opening, *i*, at the bottom. (See Fig. 4.)

Within the interior of the retort E, at a point directly over the furnace, or at any other suitable point in its length, communicates the lower end of a pipe, *f*, Fig. 5, which is connected at the upper end to one end of a box or tube, G, the opposite end of which is supported by a spring, *g*, while the end to which the pipe *f* is connected is provided with trunnions adapted to bearings on a suitable framework. (See Figs. 2 and 3.)

The pipe *f* is provided with a throttle-valve, to the stem of which is connected a toothed segment, *h*, the latter gearing into a pinion, *m*, on the shaft of a pointer, *n*, the outer end of which traverses a graduated segment, *p*.

Another graduated segment, *q*, is arranged adjacent to the pendent end of the pivoted box G, this segment being traversed by the end of the long arm of a bell-crank lever, *r*, a pin on the short arm of which is adapted to a slot in a plate, *s*, attached to the said pendent end of the box G, and serving, also, as a means whereby the supporting-spring *g* is connected to said box.

Immediately below the discharge end of the retort E is arranged the upper end of an inclined air-tight box, J, a pipe, *t*, furnishing a supply of water to the interior of this box, for a purpose hereinafter explained.

The operation of the apparatus is as follows: A fire is built in the fire-place B, and the box or tube G is filled with mercury to the level shown in Fig. 2, so that it shall be slightly higher than the level of the discharge-opening, the tension of the spring *g* being such that it will exactly counterbalance the weight which it has to sustain, and thus retain the box in this position. Desulphurized ore, in the condition of a fine powder, is fed into the receiving end of the retort from the hopper *a*, and is carried along by the screw-conveyer F until it reaches the opposite end. A portion of the powdered ore will escape through the opening *i;* but the size of this opening is so small compared with that of the receiving-opening that the retort will soon become entirely filled with ore, and the discharge through the opening at the top will commence. The valve in the pipe *f*, which had heretofore been closed, is now opened to the desired extent, the pointer *n* and graduated segment *p* affording a means whereby the extent of opening, and consequently the rate of flow of the mercury, may be very accurately determined. Mercury descending the pipe *f* is vaporized and enters the retort E, where it is brought into intimate contact with the heated ore, and is carried along with said ore toward the discharge end of the retort. During this passage the vaporized mercury is brought into intimate contact with every portion of the powdered ore, so that the thorough amalgamation of the gold or silver in the latter is insured.

The amalgamated ore, together with the vapor of mercury which has not been taken up by the same, passes through the openings *e* and *i*, and through the annular passage *b* and discharge-opening *d* into the box J, where the

water serves to thoroughly condense the vapor before the point of final discharge is reached. As the mercury gradually passes from the pivoted box G, the weight in the pendent end of the same decreases, so that the tension of the spring *g* causes the elevation of said pendent end to an extent directly commensurate with said decrease of weight, the mercury in the box G being thereby preserved constantly at the same level, and an even and steady flow through the pipe *f* insured until the contents of the box are exhausted.

The slightest movement of the pendent end of the box G is indicated by the pointer *r* on the graduated segment *q*, so that if the pipe *f* becomes clogged, or the flow of mercury into the retort is stopped in any other manner, the movement of the box G will be arrested, and this will be at once indicated to the attendant whose duty it is to examine the graduated segment *q*.

Owing to the fact that the main discharge from the retort E is at the top, said retort is kept constantly filled with powdered ore, so that the passage of the mercury vapor back toward the receiving end of the retort and its escape from the hopper are effectually prevented.

The use of the small opening *i* is to permit the discharge of the entire contents of the retort when it is desired to stop the operation.

I claim as my invention—

1. The combination, in an amalgamating apparatus, of the following elements, namely: a retort arranged within a furnace and having a screw-conveyer, a pipe for supplying mercury to said retort, a pivoted box or tube containing the mercury supply, and a device, substantially as described, for automatically tilting said box or tube, so as to constantly maintain the contents of the same at a certain level.

2. The combination of the furnace and the mercury-supply pipe *f* with a horizontal retort, E, provided with a feed-screw, F, and having the main discharge-opening on the upper side, as and for the purpose set forth.

3. The combination of the retort E, having a discharge-opening, *e*, on the upper side, with a casing surrounding the discharge end of the retort, forming the annular passage *b* and discharge-opening *d*.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

IRA M. PHELPS.

Witnesses:

RICHARD L. GARDINER,

HARRY SMITH.