(No Model.) 2 Sheets—Sheet 1.

E. SPENCER.

APPARATUS FOR AMALGAMATING ORE.

No. 345,868. Patented July 20, 1886.

Fig. 5

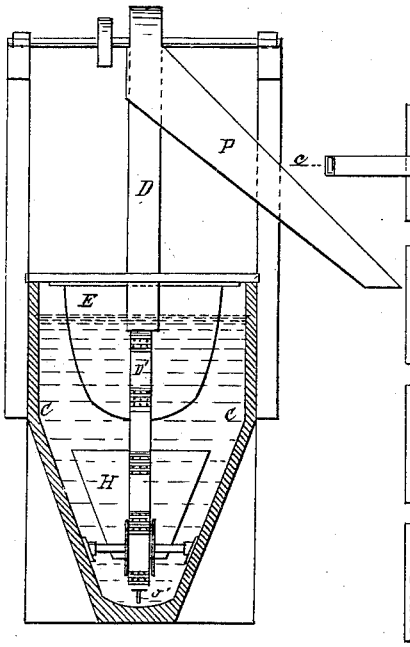


Fig. 1.

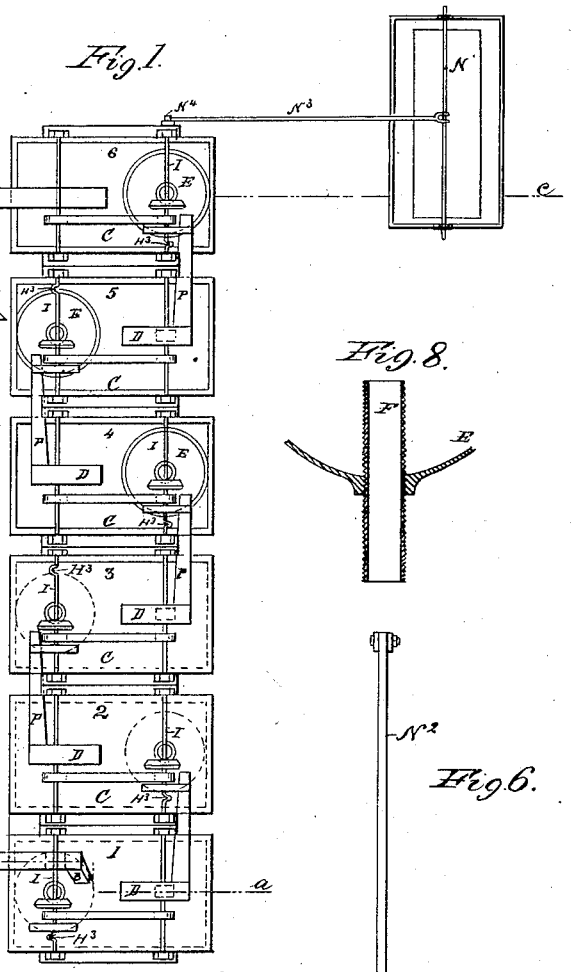
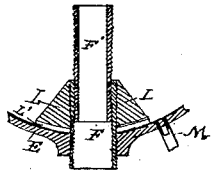


Fig. 8.

Fig. 6.

Fig. 7.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 1.

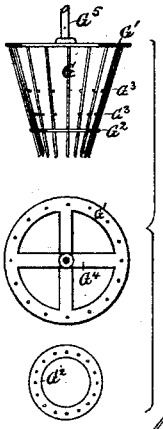


Fig. 2.

Fig. 3.

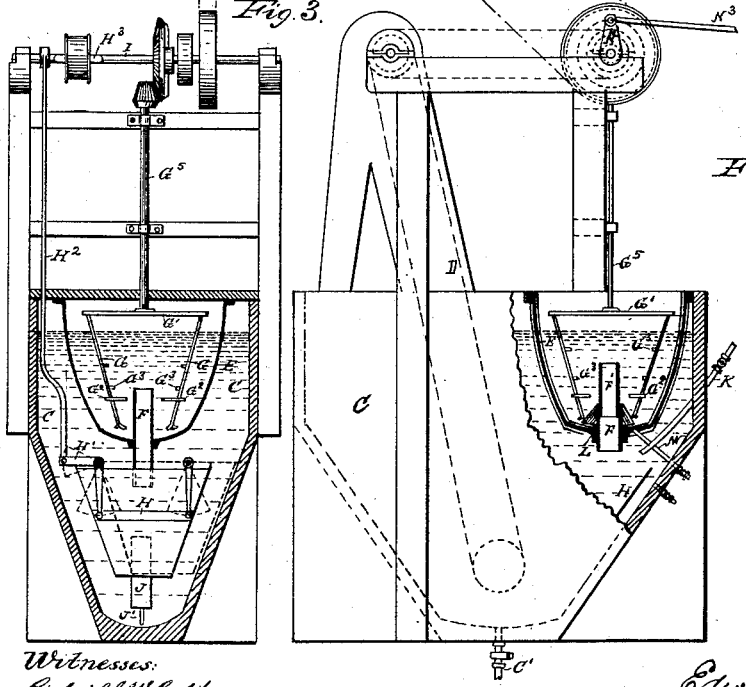
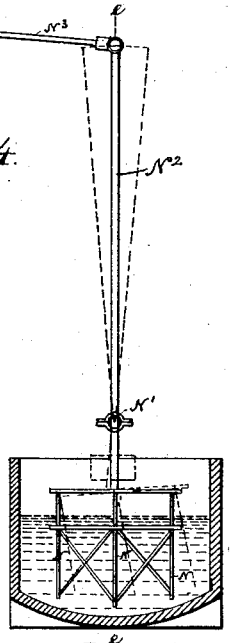


Fig. 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

EDWARD SPENCER, OF NORTH CARLTON, VICTORIA.

APPARATUS FOR AMALGAMATING ORE.

SPECIFICATION forming part of Letters Patent No. 345,868, dated July 20, 1886.

Application filed July 9, 1884. Serial No. 137,239. (No model.)

To all whom it may concern:

Be it known that I, EDWARD SPENCER, a subject of the Queen of Great Britain, residing at No. 146 Canning Street, North Carlton, in the British Colony of Victoria, builder, have invented new and useful Improvements in Apparatus for Amalgamating Ore, of which the following is a specification.

This invention relates to certain improvements in apparatus for amalgamating ore, as will be hereinafter described and claimed.

My mechanical contrivances are illustrated in the sheets of drawings hereto attached, in which Figure 1 shows a plan of the whole drawn to a smaller scale than any of the other figures, while Fig. 2 shows vertical section on the line *a a* in Fig. 1; Fig. 3, cross-section on the line *b b* in Fig. 2, with the framing and gearing shown in elevation; and Fig. 4 is a side elevation of No. 6 box and framing, the box having a portion of its side broken away so as to show the cistern E, which, with the rake-box, is a vertical section on the line *c c* in Fig. 1. Fig. 5 shows end section on the line *d d* in Fig. 2, with the overhead framing and chute in elevation. Fig. 6 longitudinal section on the line *e e* in Fig. 4. Fig. 7 shows on a larger scale a section of the pipes F and F′, the boss L, the india-rubber washer L′, part of the tank E, and the amalgam-discharge pipe M. Fig. 8 shows on an enlarged scale the pipe F and part of the tank E in Fig. 3, while Fig. 9 shows details of the agitating-cage.

Referring to Figs. 2, 3, and 5, A is a feed-box for the material to be treated. B is an elevator inclosed for the most part of its length in a sheet-iron casing, B′. C is a box which may be made of either wood or iron. If made of wood it must be lined with either copper or iron plating. It is quite closed except at the holes made for the feed-chute B^2, and for the sheet-iron casing D, of the elevator D′, which discharges itself into the chute P, leading to the cistern in the next box. E is a strong iron cistern, supported on side-bars E′, and having in its bottom a tapped opening through which is screwed a pipe, F. In this cistern is a series of converging wire rods, G, connected together at top by a flat iron ring, G′, and near the bottom by a smaller flat iron ring, G^2. On the inner side of each of these wire rods are two projecting studs or fingers, G^3. This series of agitators is connected by a cross-head, G^4, with a vertical shaft, G^5, which is revolved by the well-known contrivances shown. Below the cistern E is a shaking or oscillating iron table, H, connected by bell-crank H′, and rod H^2, with crank H^3 on shaft I. J is a flat bar or connection for sustaining and conveying an oscillating motion to rake J′, which is stayed by rod J^2, pivoted at either end. C′ is a discharge-tap for the solid deposits. C^2 and C^3 are discharge-taps for the waste, and K is a steam-supply pipe, which is not used in boxes 4 and 5. The elevator cups or buckets are perforated, so as to remove as little liquid as possible.

Referring to Fig. 4, the strong iron cistern E is lined inside with an amalgamated copper lining, and through the hole in its bottom is a pipe like F, (see Fig. 7,) but containing a second pipe, F′, which screws into F, and around said pipe F, inside the cistern, is a thick copper boss, L, screwed tightly down onto an india-rubber washer, L′. The dark lines at the bottom of the pan represent the quicksilver, and M the amalgam draw-off pipe. In this case the oscillating table H consists of an amalgamated copper plate instead of iron, as in the other boxes.

Referring to Figs. 4 and 6, N N N are harrows or rakes supported by one common framing and attached to a rocking shaft, N′, to which motion is imparted by rods N^2 and N^3 from crank N^4, as shown.

Figs. 2, 3, and 5 represent boxes marked 1, 2, 3, 4, and 5 in the plan, Fig. 1, and Fig. 4 represents the box, marked 6 in the plan. I take, say, two hundred weight of fresh Roche lime and mix it and six pounds of common washing-soda with, say, one hundred and twenty gallons of fresh water, stirring it all well together. I then remove this mixture to another vessel and allow it to settle. When settled, I draw off the supernatent liquor, which is the solution I use. Boxes 1, 2, and 3 are supplied with my chemical solution to the level shown, and have covers fitted on them, while boxes 4, 5, and 6 are supplied with water to the same level, and are without covers. The cistern E in box 6 is the only one that contains any quicksilver. In the first three boxes the gold is freed from the baser metals by the chemical solution, in the

fourth and fifth the auriferous material is washed of the chemical solution, and in the sixth the gold is amalgamated.

The *modus operandi* is as follows: First of all the boxes 1, 2, and 3 are charged with the chemical solution, and boxes 4, 5, and 6 with water, and the cistern in box 6 with quicksilver. Then steam is supplied through the pipes K, and the apparatus is ready for treating material. This must be supplied dry to the box A, from whence it is lifted by elevator B, and discharged down chute B^2 into the iron cistern E in box 1. Here it is agitated by the agitating-rods G, and finally finds its way down the pipe F, falls onto the shaking-plate H, and then either deposits itself at the bottom of the box, there to be agitated by the rake J′, or is carried by the elevators D′ and discharged through chute P into box 2, where it is treated in identically the same way, and so on from box to box until it reaches box 6, where the amalgamation takes place, and the waste only falls down the pipes F′ F into the bottom of this box. After these boxes have been sufficiently used they are disconnected from the driving-power, and whatever deposits are found therein are removed to the rake-box, Fig. 6, where they are subjected to a further raking to and fro, after which the water is drawn off and the light stuff at the top removed, while the bottom layer is conveyed to box 6, (see Fig. 4,) and there treated in the same way as the other material subjected to its operation. In the event of its being desired to treat auriferous material having no arsenic or sulphur, it is only necessary to use box 6, as this will effect the extraction and amalgamation of the gold.

I am aware that it is not new in the art of extracting the precious metals from ores to combine agitating-tanks, elevators, amalgamating and settling chambers, and I do not claim such, broadly.

Having thus described the nature of my invention and the manner of performing same, I would have it understood that what I claim is—

1. The combination, with the box C, of the oscillating table H, operating-shaft I, crank H^3 thereon, bell-crank H′, and rod H^2, connecting said crank and table, substantially as and for the purpose set forth.

2. The combination, with the box C, of the oscillating table H, operating-shaft I, crank H^3 thereon, bell-crank H′, and rod H^2, connecting said crank and table, rake J′, pivoted stay-rod J^2, and bar J, connecting said oscillating table and rake, substantially as and for the purpose set forth.

3. The combination of feed-box A, elevator B, box C, having openings in its top, chute connecting the elevator B, and box C, elevator D, passing within said box C, and connecting with a chute leading to a cistern in an adjacent box, a cistern, E, supported within the box C, and having at its bottom communication with the box C, said cistern being provided with a series of connected agitators composed of converging wire rods each having outwardly-projecting studs or fingers, substantially as and for the purpose set forth.

4. The combination of feed-box A, elevator B, box C, having openings in its top, chute connecting the elevator B and box C, elevator D, passing within said box C, and connecting with a chute leading to a cistern in an adjacent box, a cistern, E, supported within the box C, and having at its bottom communication with the box C, said cistern being provided with a series of connected agitators, oscillating table H beneath said cistern E, and means, substantially as described, for oscillating the same, and the oscillating rake J′, substantially as and for the purpose set forth.

5. The combination, with the feed-box A, box C, elevator B, connecting the same, elevator D, connecting said box C, and an adjacent supplemental box, cistern E, supported within said box C, and having communication at its bottom therewith, a series of agitators supported within said cistern, an oscillating table arranged beneath said cistern, a rake, J′, at the bottom of the box C, and the harrows or rakes N, supported by a single framing and connected to rocking shaft N′, rods N^2 N^3, and crank N^4, substantially as and for the purpose set forth.

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