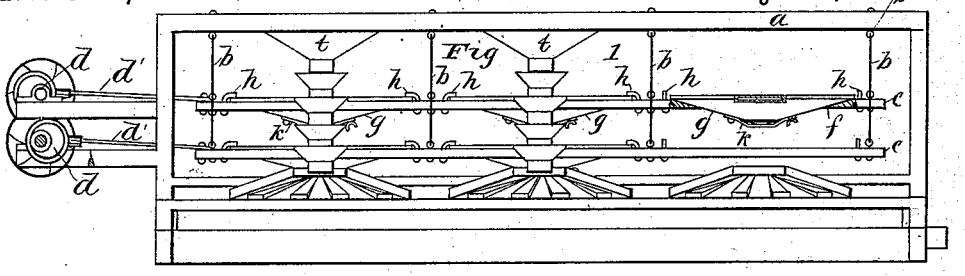
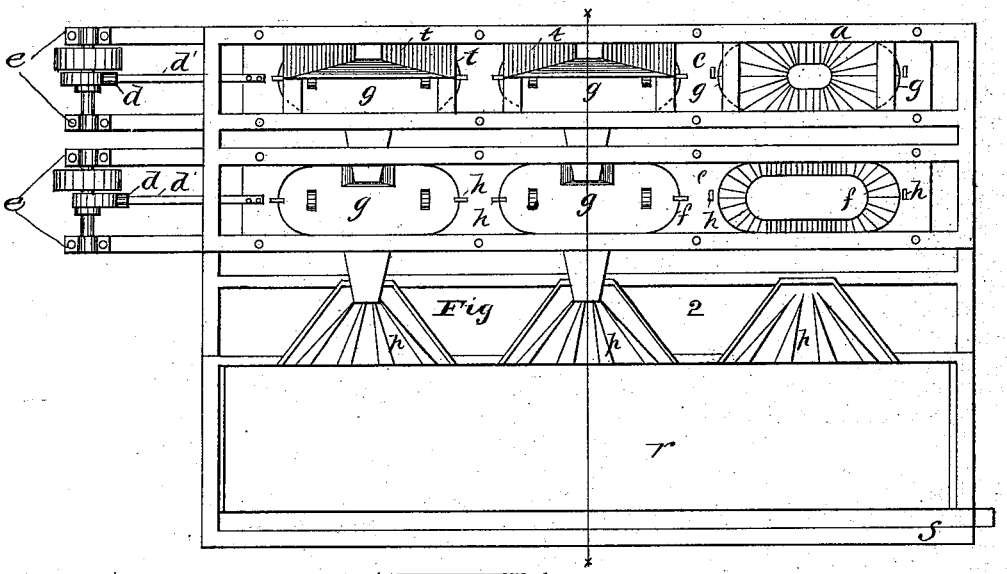
(No Model.)

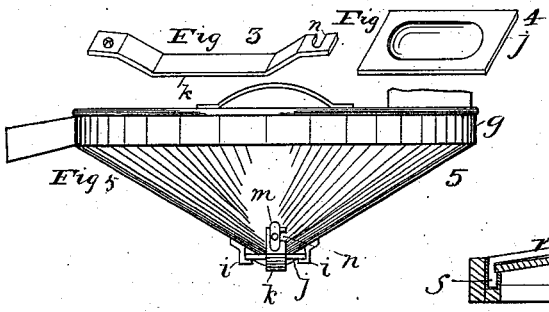
W. M. HARTMAN.

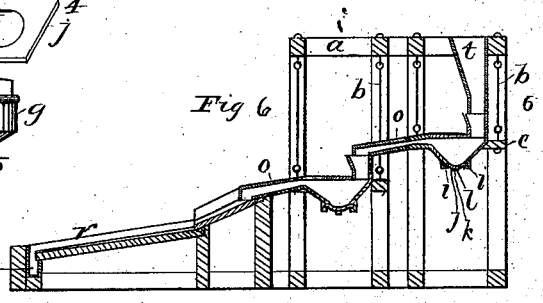
COMBINED CONCENTRATOR AND AMALGAMATOR.

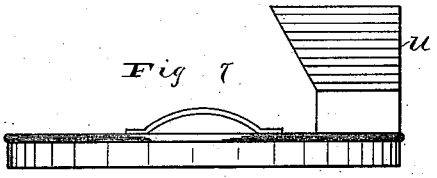
No. 382,701. Patented May 15, 1888.











WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM M. HARTMAN, OF DENVER, COLORADO.

COMBINED CONCENTRATOR AND AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 382,701, dated May 15, 1888.

Application filed July 1, 1887. Serial No. 243,101. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. HARTMAN, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Combined Concentrators and Amalgamators for Mineral Ores; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to combined concentrators and amalgamators for auriferous and argentiferous sands and ores and other valuable material.

The object of my invention is to provide a simple and effective concentrator for mineral ores, in which they may also be amalgamated. I attain this object by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of my device. Fig. 2 is a top view of the same. Fig. 3 is a view in perspective of the strap for holding the movable bottom in place. Fig. 4 is a view of the movable bottom in perspective. Fig. 5 is an end view of one of the concentrating-pans with the spouts broken off. Fig. 6 is a vertical section through the line *x x*, Fig. 2. Fig. 7 is an end view of one of the pan-covers.

Similar letters refer to similar parts throughout the several views.

In the drawings, *a* represents the main frame, from the top of which are hung (by the rods *b*, which are provided at either end with an eye, which is held by a staple or eyebolt, *b'*) a series of swinging shelves, *c*, which are arranged in steps, one in front of and below the other, and which have a transverse reciprocating motion imparted to them by one or more eccentrics, *d*, operating in suitable bearings, *e*, on the frame, and which are connected with the shelves *c* by the rods *d'*, which are fastened to them by any suitable means. In the shelves *c* openings *f* are made, in which the concentrating-pans *g* are held by buttons *h*, pivoted to the shelves and arranged to turn and grip the edge of the pans, as shown in Fig. 2.

The pans *g* are formed, as shown in the drawings, with sides flaring from an oblong opening, *l*, on which sides are fixed grooved ways *i*, into which the movable bottom *j* is slid and then held in place by the strap *k*, which is pivoted to the pan near one end of the opening *l*. The other end of the strap is formed with a slot, *n*, which is hooked over a button, *m*. A spout, *o*, attached to one side of the pan, carries the material from one pan to the next lower. The last pan delivers the tailings on the distributers *p*, (which may be of any ordinary kind,) from which they are carried over a stationary amalgamated copper plate, *r*, to a discharging-trough, *s*. The covers for the pans are provided with hoppers *u*, which serve as inlets to the pans. (See Figs. 6 and 7.)

In operating, the machine may be used with or without water, as may be desired; but I prefer to use water when it is obtainable, in which latter case the ore and water are introduced into the hoppers *t*, (which are held in the top of the main frame,) from which they descend into the first pans, where they are agitated by the motion of the pans, the water carrying the light particles forward and the heavy valuable particles remaining and settling into the movable bottom. The light particles are again subjected to the action of the next pan, and so on from pan to pan until they are finally discharged through the distributer onto the amalgamated plate, *r*, from which they are discharged, as before stated. In passing from pan to pan the valuable particles sink through the agitated mass into the bottom *j*, which may be removed when desired with the value contained therein, leaving the valueless material in the upper portion of the pan, but which may drop through as soon as the bottom is removed.

The plates *r* are for the purpose of retaining such valuable particles as may pass through the pans.

Mercury may be placed in the movable bottoms, and as the valuable particles come in contact they will, if clean, be amalgamated and held by the mercury.

I am aware that it was old in the art of con-

centrating and amalgamating the precious metals prior to my invention to use not only plate amalgamators, but also dish-shaped amalgamators and flat or trough amalgamators, and also to use a series of tables, one above the other, devices giving a jigging or reciprocating motion being used with all such forms of amalgamators; and also that it was old to construct an amalgamating-flume with a waved bottom, the waves lying transversely across the flume and slotted at their bottom, mercury-troughs being secured beneath such slots; hence I do not claim, broadly, any such features or any such constructions; but

What I do claim is—

1. The combination of the main supporting-frame, a series of tiers of hanging shelves supported therein, each tier being in vertical and horizontal planes different from such planes of any other tier, so that the tiers are arranged in step fashion, a series of amalgamating-pans supported thereon, and means for imparting a reciprocating movement to the shelves and pans, substantially as set forth.

2. An amalgamating-pan having sides flaring from the base to the rim, an aperture at such base with grooved ways upon two of its sides, a mercury-pan taking in such grooved ways and closing the aperture, and a strap passing beneath the mercury-pan and additionally securing it in position, substantially as set forth.

3. The combination of a main supporting-frame, two or more shelves suspended therein in different vertical and horizontal planes, a series of flaring pans carried thereon and having removable dished bottoms or mercury-pans held thereon in grooved ways, and means for imparting a reciprocating motion to the shelves and pans, substantially as set forth.

4. The combination of the main supporting-frame, two or more shelves supported therein in different vertical and horizontal planes, flaring-sided pans supported upon the shelves and arranged to discharge from a higher into a lower series, and means for imparting a reciprocating motion to the pans and shelves, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM M. HARTMAN.

Witnesses:
F. S. GILMORE,
W. B. GILMORE.