(No Model.)

W. A. FRANK.

ORE CONCENTRATOR.

No. 335,219. Patented Feb. 2 ,1886.

Fig. 1.

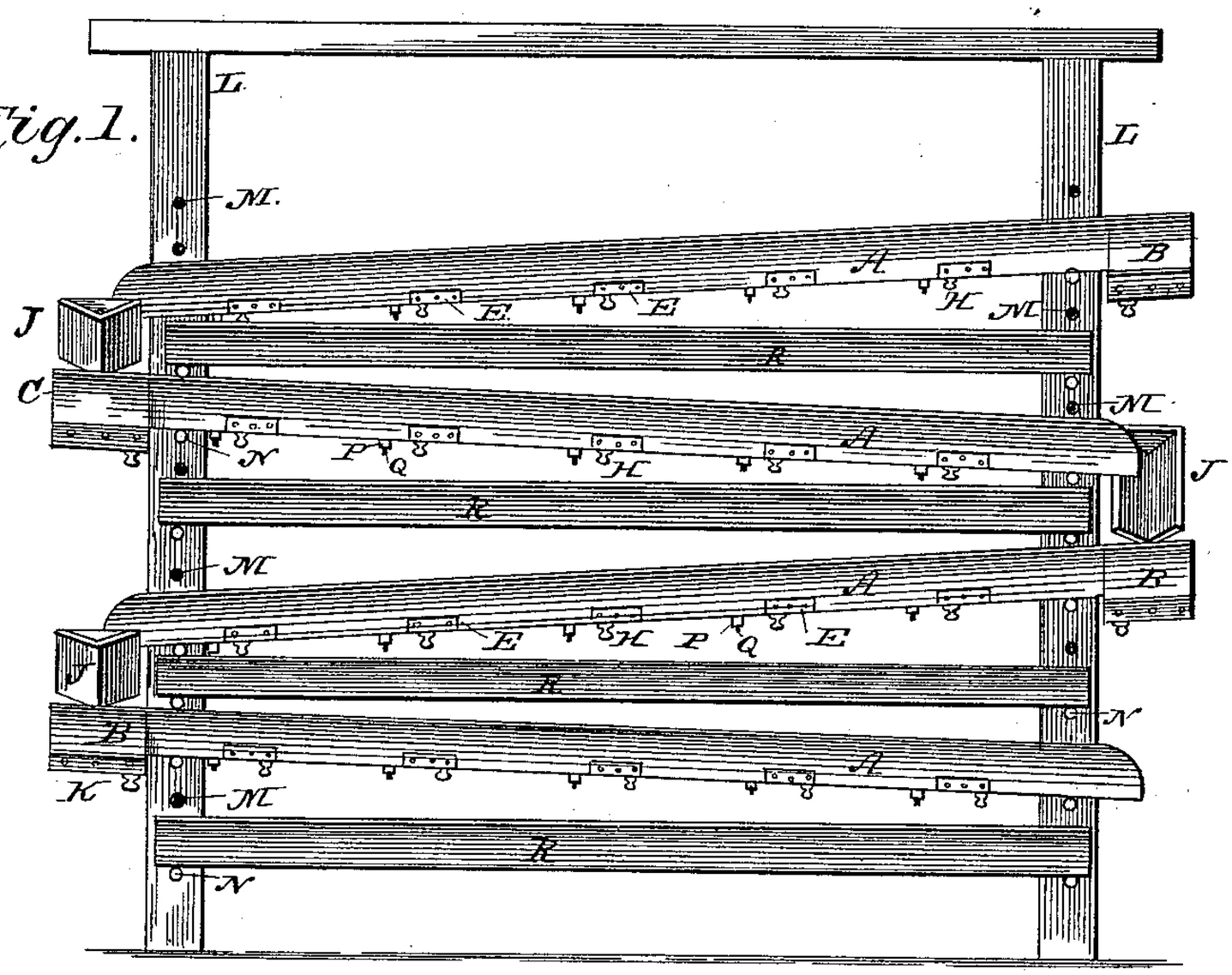


Fig. 2.

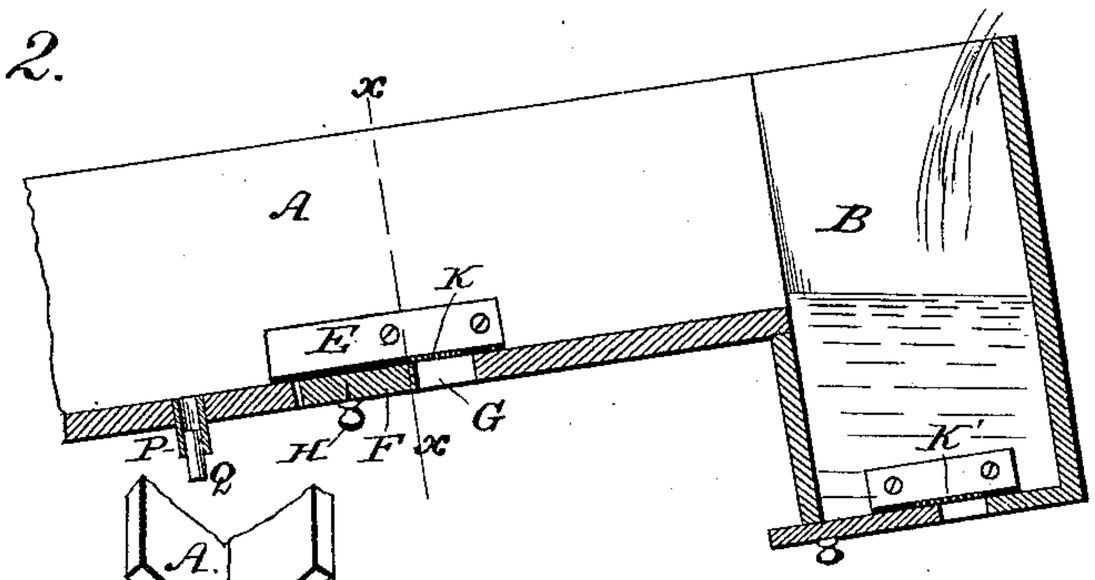
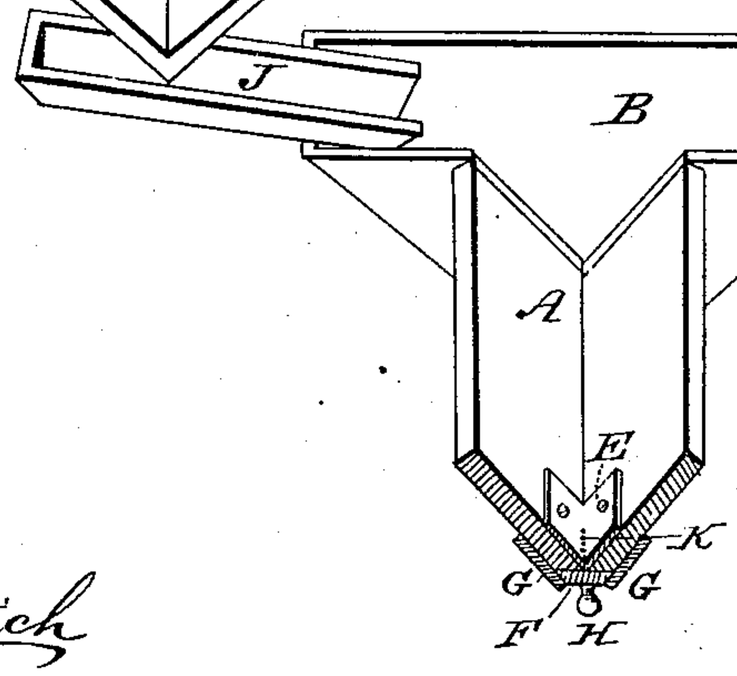


Fig. 3.



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WILLIAM A. FRANK, OF PINAL, ARIZONA TERRITORY.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 335,219, dated February 2, 1886.

Application filed October 20, 1885. Serial No. 180,451. (No model.)

To all whom it may concern:

Be it it known that I, WILLIAM A. FRANK, a citizen of the United States, residing at Pinal, in the county of Pinal and Territory of Arizona, have invented certain new and useful Improvements in Ore-Concentrators; and I do hereby 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.

This invention relates to that class of ore-concentrators which are used for washing pulverized ores to separate precious metals therefrom; and the object of the invention is to save the extremely fine particles of metal which would pass off in the tailings in most other methods of separation.

To this end my invention consists in the construction and combination of parts forming an ore-concentrator, as hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of one form of my invention. Fig. 2 is a longitudinal section of a portion of a trough, showing the principal features of my invention; and Fig. 3 is a transverse vertical section of the same on the line *x x*.

A represents any one of a series of troughs or leaders along which the pulp runs in the process of separating the metal therefrom. The said pulp is pulverized ore, and consists of sand and precious metal in very finely-comminuted particles as they are found in the tailings of other separators or as they leave the pulverizer mixed with sufficient water to flow freely. The pulp may run in a stream directly from the pulverizer into the box B, from which it flows into the leader A, down whose gentle incline it runs to the next box, C, from which it overflows into another inclined trough A, or into a short spout, J, connecting the two, and so on through any number of troughs required to separate the metal from the sand. This is done by a series of traps, E, which I prefer to locate about a foot apart in troughs, each about twelve feet long. I make a trough by nailing two boards together, forming a V-shaped groove, and I place each trough with its angle opening upward. Each trap E consists of a piece of thin metal shaped to fit within the angle of the trough, and perforated vertically in its angle with a series of holes, K, too fine to permit the common particles of sand to pass through. These holes will vary in size from one one-hundredth to one-sixteenth of an inch in working different kinds of ore proportionally to the fineness of the particles into which the ore is reduced by being pulverized, and each trap will be thus perforated for about one inch along the extreme lower edge of the angle of the trough, in order that the metal which, being heavier than the sand, settles in the pulp to the bottom of the groove, may be trapped as it is washed along by the current of the pulp.

If the trap extended the whole length of the trough, enough metal would not sink from the richest pulp to keep all the holes employed, and fine sand would escape through a portion of the holes; and as it takes a little time for the metal to settle I locate the traps about a foot apart, as stated.

If the trough were a broad wire-screen, it would increase the objection above stated by offering far more opportunity for escape than there could be particles of metal to keep employed, so that the pulp would pass through unseparated. When the pulp is very rich in metal, more openings would be required for it to escape in passing than if the pulp were lean. I have therefore provided each trap with a gate, F, fitted close up to the perforated sheet metal to slide lengthwise with the trough in a groove formed by two side cleats, G, and provided with a knob or handle, H, by which it may be slid to open or close it. The gates slide up the incline to close the trap, in order that the upper end of the latter may be first uncovered or opened. Each gate may be opened, or all the gates may be set wide open. It is evident that by long experiment it could be ascertained how close together the plates E should be placed along the trough, and how long each plate should be to economically operate on a given ore, so that the gates F might in such cases be dispensed with; but the cost of the gates is so trifling that I prefer to apply them

in each trough. By this means my concentrator may be graduated to operate upon pulp of any degree of richness or leanness.

To continue extracting the metal until the very last particle of it is saved from the pulp, I place a series of troughs, A, one above the other, each provided with the traps described. I also place a box, B, at the head of each trough, set with its bottom inclined from two sides to form an angle like the trough, and in this angle I place a trap, K′, which is constructed like the trap K and operates in a similar manner, only that in the boxes B the pulp is agitated by pouring from the end of a previous trough or spout, while it runs very smoothly and gradually in the troughs. The object of this agitation is to bring force to bear upon the particles of metal to overcome the natural repulsion which fine dusty particles of anything have to being wet. This repulsion frequently causes particles of heavy metal to float on the water, and to resist becoming wet and sinking, even after they are under water. Therefore I apply force upon the particles to wet them by allowing the pulp to fall into a pool in each box B. To this end each box is deeper than the trough, and the trough is attached to one side of the box, at some distance above the bottom of the latter. Thus a pool of pulp is constantly retained and agitated by the incoming stream, and it flows out from the top of the pool. This is more particularly necessary from the fact that the leanness of the pulp on which my concentrator is especially designed to operate prevents the metallic particles from settling rapidly, therefore requiring that the pulp should not be agitated during the settling process. On this account I give but very little slant to the troughs—say about six inches in twelve feet—and to adapt the troughs to working various ores I provide means for setting them more or less slanting. One device which would accomplish this is a pair of posts, L, each provided with a series of holes, M, and removable pins N, to be placed in the holes to support the troughs A.

P represents a series of pipes, of about one-eighth of an inch internal diameter, entering the trough at its lower corner or bottom halfway between the traps, for the purpose of allowing larger grains of metal to escape from very rich pulp. Each pipe is provided with a plug, Q, which may be removed like a gate to operate on the same general principle as the traps E. Below the troughs may be placed any suitable receptacles, R, for the metals to fall into from the said traps and pipes.

Having thus particularly described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a V-shaped trough and a series of plates, E, fixed at intervals in the bottom thereof, each plate being perforated with a series of fine holes in a line along the inner angle of the trough, the finest of the holes bearing the relation described to the fineness of the pulverized ore to be operated upon, substantially as shown and described.

2. The combination of a V-shaped trough, a series of metallic plates fixed at intervals therein, each plate being perforated with fine holes in a line along the inner angle of the trough, and gates fitted to slide beneath the said perforations along the trough, substantially as shown and described, whereby one or more of the holes in each plate may be closed, as set forth.

3. The combination of a V-shaped trough, placed with its lower angle opening upward and provided with traps, as described, and an angular box secured to one end of the trough, the trough opening into the side of the said box at some distance above the bottom of the latter, substantially as shown and described.

4. The combination of a series of V-shaped troughs placed slantingly one above the other, with the lower angle of each opening upward, a series of angular boxes, one secured to the upper end of each trough, the troughs communicating one with another by means of the boxes, and both troughs and boxes provided with outlet-traps, substantially as shown and described, for the purpose specified.

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

WILLIAM A. FRANK.

Witnesses:
THEO. MUNGEN,
W. X. STEVENS.