

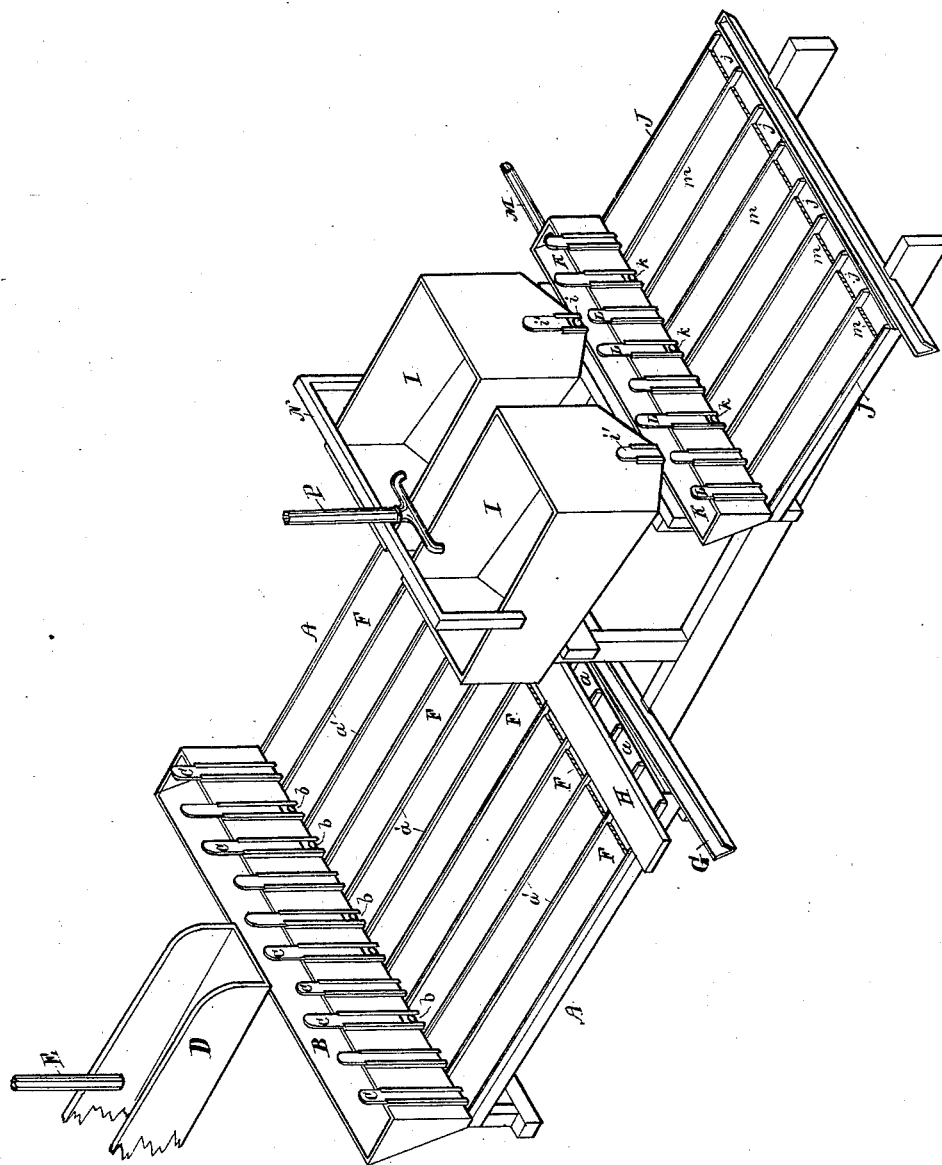
(No Model.)

F. MORRIS.

ORE CONCENTRATING APPARATUS.

No. 302,350.

Patented July 22, 1884.



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UNITED STATES PATENT OFFICE.

FREDERICK MORRIS, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-FOURTH TO JOHN H. GYSELAAR, OF SAME PLACE.

ORE-CONCENTRATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 302,350, dated July 22, 1884.

Application filed November 17, 1883. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK MORRIS, of the city and county of San Francisco, and State of California, have invented an Improvement in Ore-Concentrating Apparatus; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to certain improvements in machines for working ores, rock, gravel, or tailings in which free precious metal is contained, either alone or associated with ores of base metals or sulphurets.

It consists in means for separating the precious particles from the sulphurets or other material with which it is mechanically united, concentrating them and running off the other material by one or more successive operations over an apparatus prepared for the purpose, so that the concentrations thus obtained may be amalgamated or otherwise treated without the presence of a large quantity of worthless material, which fouls and carries off the mercury and interferes with the amalgamation. This concentration is effected upon one or more perfectly plane tables having the surface slightly inclined from one end to the other, and subdivided into narrow channels, the bottoms of which are covered with blanket, canvas, or other fibrous material, in which the heavier particles of precious metal will be retained, while the worthless material will pass off, these channels being supplied from transverse troughs with regulating-gates for each channel. Washing-tanks are placed between the successive series of channels, so that the fibrous bottoms of the channels, when filled with concentrates, may be washed out, the concentrates allowed to settle, the muddy water siphoned or drawn off, and a fresh supply of pure water added before they pass through the second series of channels.

Referring to the accompanying drawing for a more complete explanation of my invention, the figure is a perspective view of my concentrating apparatus.

It has always been customary to crush ore, rock, or other material containing precious metal to a certain degree of fineness and amalgamate as much as possible in the battery, the whole of the material being then taken to amalgamating-pans or other apparatus to be

further treated in bulk, the waste material not being finally run off until the operations are completed. If there are sulphurets in any great quantity associated with the precious metal, they are frequently concentrated out by tables, riffles, or other apparatus, and afterward treated independently by chlorination or other process.

The union of the gold in the working of the ore to which my invention particularly applies with the base sulphurets is not a chemical union, but only a mechanical one, similar to its union with the earth or rock, except that the gold is much finer and cannot be separated without being crushed finer. In my invention I crush the ore, rock, sulphurets, or other gold-bearing material very fine, pass it through my apparatus, where the gold is settled and retained in the fibrous bottoms of the channels with but little foreign matter, and when finally amalgamated the process is not hindered or the mercury fouled by the large quantity of worthless material by which the bullion obtained by the usual processes is often rendered nearly worthless.

A is a downwardly-inclined or sloping floor, the surface of which is divided into a number or series of parallel runs, *a*, by raised division-strips *a'*. There may be as many of these runs as can be conveniently worked, though I prefer to have about ten, each being quite narrow.

B is a trough or hopper at the head of the runs, and provided with discharge-holes *b*, a hole opening in the center of the head of each run. Sliding gates *C* are fitted to the front of the trough and cover up or open partially or completely the discharge-holes *b*.

D is a chute or passage which is to be connected with the battery, but which I have not here shown. The tailings or crushed ore from the battery are discharged into chute D, and pass thence into trough B.

E is a pipe adapted to discharge clear water derived from any suitable source into chute D.

In each of the runs *a* are laid separate strips of blanket or canvas, *F*, which are designed to catch the small particles of gold. Across the lower end of the floor A is a spout or channel, *G*, into which the waste from the runs is discharged, and by which it is carried off to

one side. Across the top of the floor at its lower end is a plank, H, for standing on while washing the blankets. Supported at the foot of floor A are tanks I, having bottoms converging to a longitudinal central line, which is sloped toward the forward end. Each tank is provided with a discharge-aperture, *i*, regulated by an adjustable gate, *i'*; and is supplied with water from a pipe, P.

J is a second floor, similar to floor A, and having separate runs *j*, similar to runs *a*. Blankets *m* fit the runs. These are supplied from a transverse trough, K, at their heads, provided with discharge-holes *k*, regulated by adjustable gates L, similar in construction and operation to those already described in connection with trough B. The trough K is supplied with water from a pipe, M. Above the tanks is a cross-rail, N, for hanging up the blankets to drip after being washed. The discharge-apertures of the tanks are in connection with the trough K, whereby the contents of said tanks may pass into the trough.

In ordinary cases, where a single blanket run is used, the ore supplied to it and the amount of water necessary to run in with it are so great that the particles are not separated, and the wash carries them off. In concentrating apparatus where a single belt or blanket, movable or immovable, receives the tailings or ore and water, the same fault is noticeable, and, in addition, the sagging of the belt prevents that even and extended distribution which is so necessary. The consequence is that the concentrations do not reach a very high per cent., and are principally sulphurets, which require such subsequent and expensive working that were very fine concentrations substituted it would not be profitable to work them; nor is a subdivided run having a wavy or broken surface applicable for my purpose, as the very portions—the sulphurets—which I desire to run off are caught, whereas on a plane surface they are not; but my purpose is to catch and concentrate as many as possible of the minute particles of free gold, and this I am enabled to accomplish by means for spreading the pulp over a great and perfectly plane surface in very thin and even layers, which will give the small particles a chance to lodge instead of being carried off by the wash.

My invention is as applicable to working over the tailings cast aside as worthless, after being once worked by means already in use, or for further working concentrations of known machines, as for primary operation, but in any case and as a preliminary for the perfect operation.

As before mentioned, I stamp the ore very fine, because gold as found is never chemically, but is always physically, combined with other substance. It is obvious that the finer the ore is crushed the better will the gold be separated, and the sulphurets, being crushed fine enough, are readily washed away with the tailings as worthless, my purpose being to catch

the gold and not the sulphurets. This fine-crushed ore is passed from the batteries through chute D into trough B with the water, which is supplied through pipe E. In the trough the pulp is distributed throughout its length, and passes out through holes *b*, the gates of which are so adjusted as to allow an equal discharge through each, and the capacity of the discharge is also regulated in such manner that the amount allowed to pass into the runs is limited so as to spread itself in a thin layer over each run. The essential difference between my floor thus divided into separate narrow runs and a floor undivided is in the adaptability of the former to the use intended. In the narrow runs the thin layer of pulp is possible, while in a wide one it cannot be managed with any degree of certainty, it being liable to pack in many places; and by having a number of runs I obtain sufficient superficial area for the capacity of the stamp-mill without overloading it. The independent gates for each discharge enable me to regulate accurately the flow in each run, and prevent it from becoming overloaded. The fine free particles of gold find lodgment on the blankets, while the waste passes off to the spout G, and is discharged out of the way. In this waste the sulphurets all, or nearly all, are included, as they are unprofitable in many cases, and are wholly so when the ore is crushed fine and the gold particles more fully liberated. When the blankets have become charged or loaded with a quantity of concentrations, they must be taken off and washed; and in connection with this necessary operation arises another advantage of my apparatus.

Instead of having to shut down the working of the device, I let it continue, and simply remove the blanket of one run at a time, while the operation over the remainder is still going on. I may provide for the removal of any one blanket by shutting down the gate of its run; but if I should not want to disturb the gate, which had been previously adjusted with great nicety, I stuff a cloth behind its discharge temporarily. The operator takes the blanket of one run, and, standing on the cross-plank H, washes it in the tank I, which is filled with water through pipe P. Then he hangs it up on the cross-rail N to drip, and washes another, and then returns the first to its place, and so forth to the end of the blanket-washing operation. When sufficient concentrations are washed into the tanks and have settled down as blanket washings, the surplus water in the tanks is bailed or siphoned out, leaving the washings in a mass of somewhat thick consistency in the bottom. The gates *i'* of the tanks are then opened just enough to allow a very fine stream of these washings to pass out into the trough K, where they are mingled with more clear water supplied through pipe M. From this trough the washings and water pass out over the floor J, spreading in each of the runs *j* thereof over the blankets *m*, which catch all or nearly all of the gold particles, letting

the worthless material pass off. This second concentration saves about all the concentrates which will be found profitable to work subsequently, and they may afterward be worked in any suitable manner with little expense, as they are nearly all gold, the sulphurets having been washed away.

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

1. The herein-described apparatus, comprising the series of parallel narrow channels having inclined plane surfaces covered with a fibrous material, hoppers or troughs with valves and openings, from which pulverized material and water are delivered into said channels, and intermediate tanks, in which the first series of fibrous coverings are washed, substantially as herein described.

2. The herein-described apparatus, comprising the floor A, having the narrow parallel

runs *a*, the bottoms of which are plane, the blanket coverings, the floor J, having similar runs, *j*, the distributing-troughs B K at the head of each floor, having adjustable discharge-gates C L and openings *b k*, and the tanks I between the two floors, said tanks having regulating-discharge-gates *i'* and openings *i*, substantially as herein described.

3. In a concentrating apparatus, the tanks I, in which the blankets are washed, having discharge-apertures *i* and adjustable gates *i'*, in combination with the trough K, having discharges *k* and gates L, the water-pipe M, and the floor J, having the narrow separate blanketed runs *j*, substantially as herein described.

In witness whereof I have hereunto set my hand.

FREDERICK MORRIS.

Witnesses:

C. D. COLE,
J. H. BLOOD.