(No Model.) 3 Sheets—Sheet 1.

L. C. MORELAND.

AMALGAMATOR AND ORE CONCENTRATOR.

No. 479,140. Patented July 19, 1892.

Fig. 1.

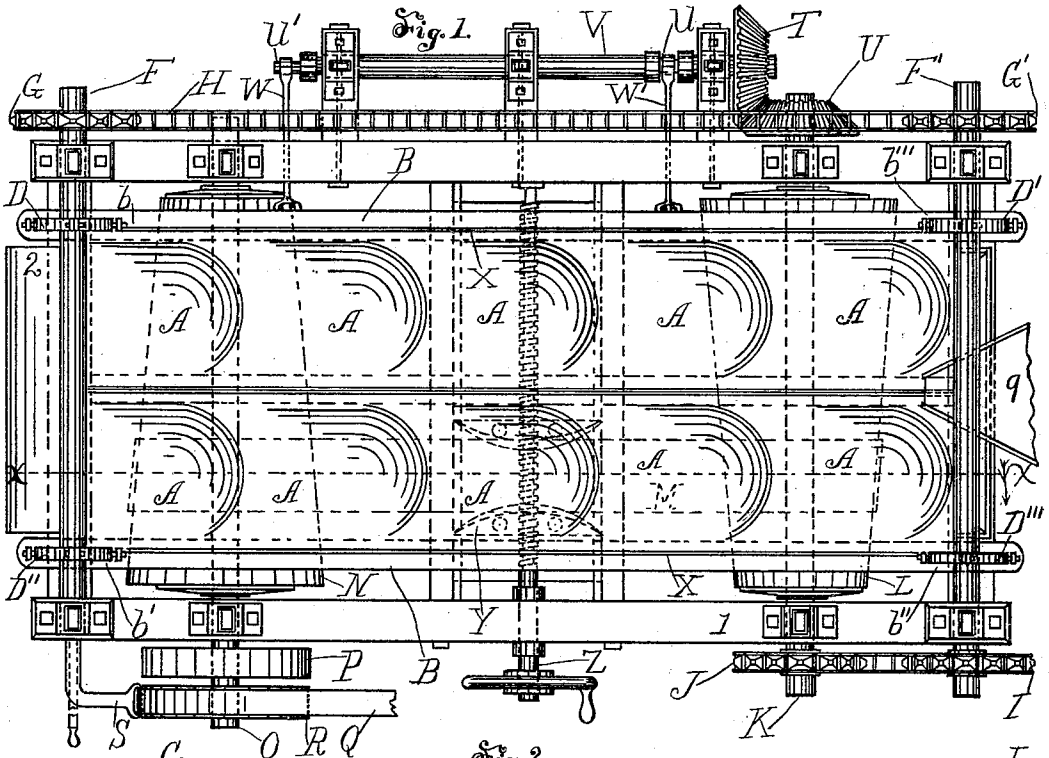
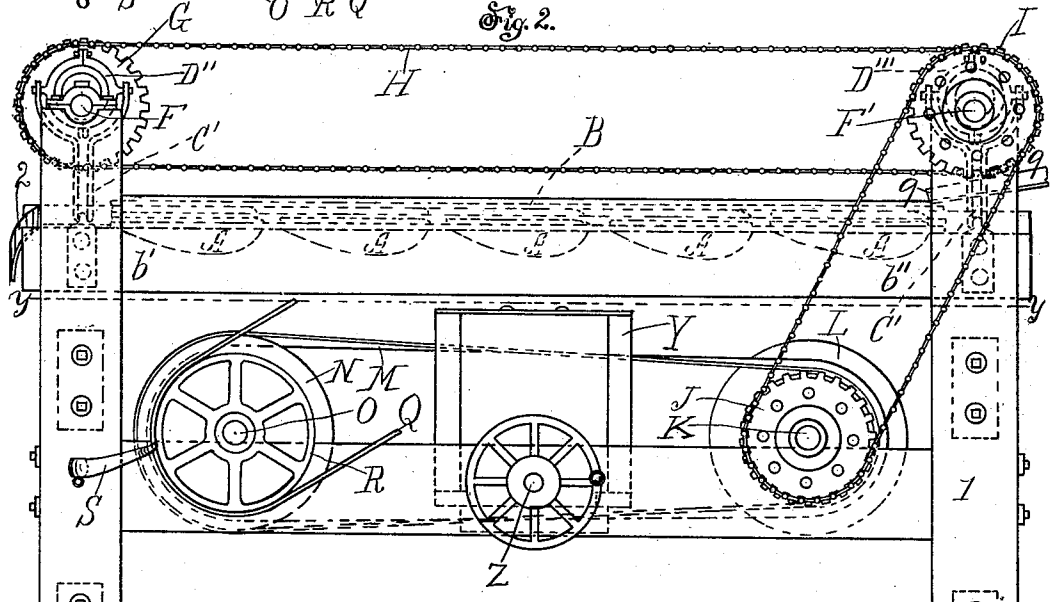


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

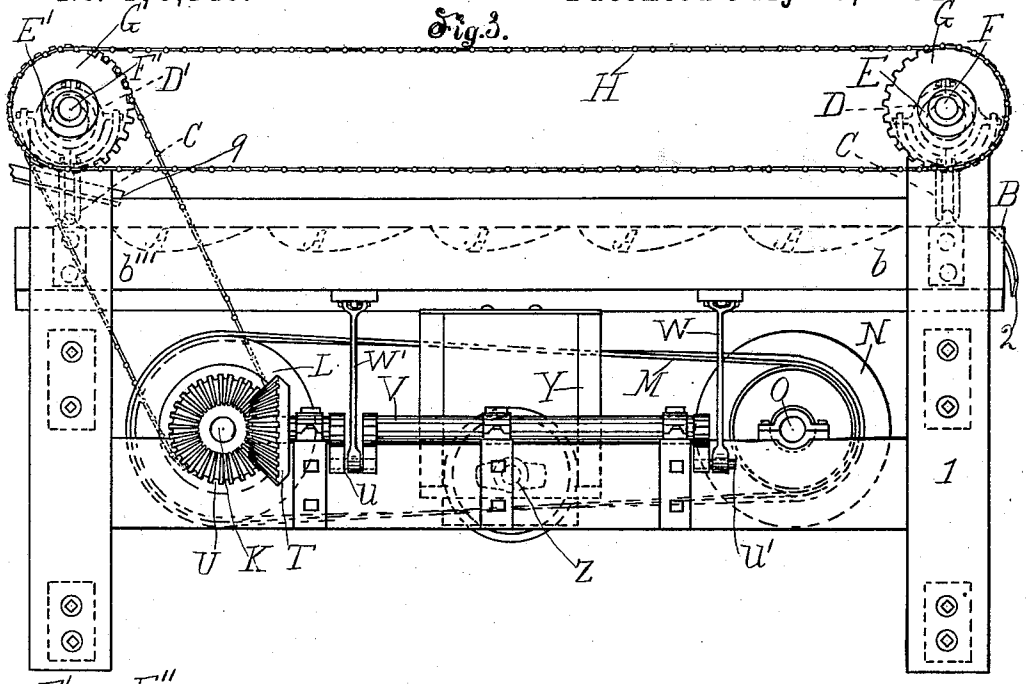
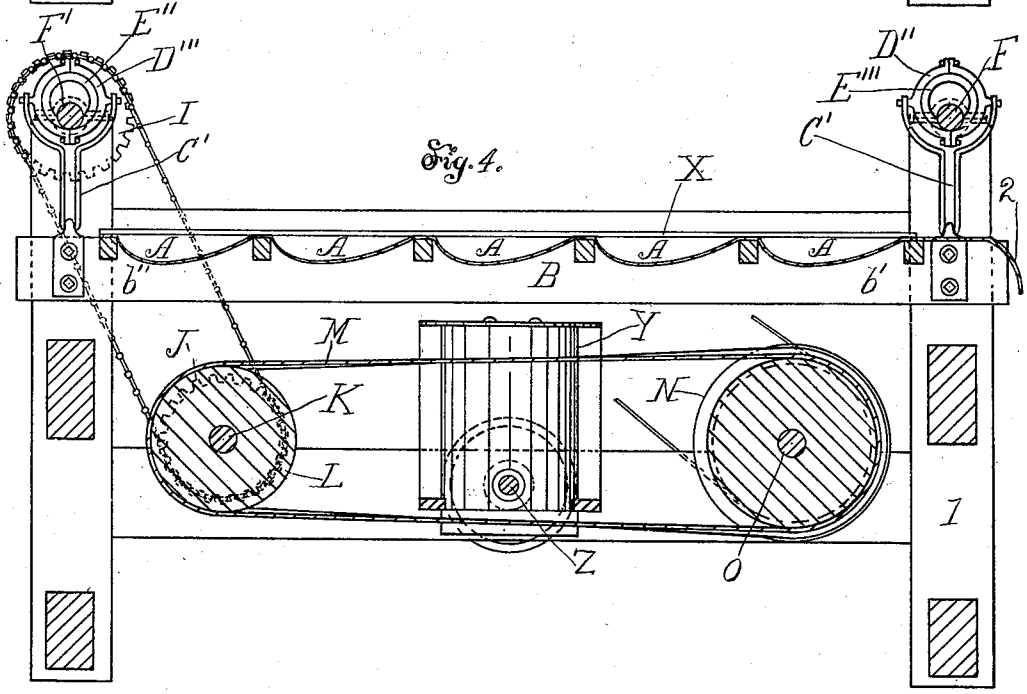


Fig. 4.



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(No Model.) 3 Sheets—Sheet 3.

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AMALGAMATOR AND ORE CONCENTRATOR.

No. 479,140. Patented July 19, 1892.

Fig. 5.

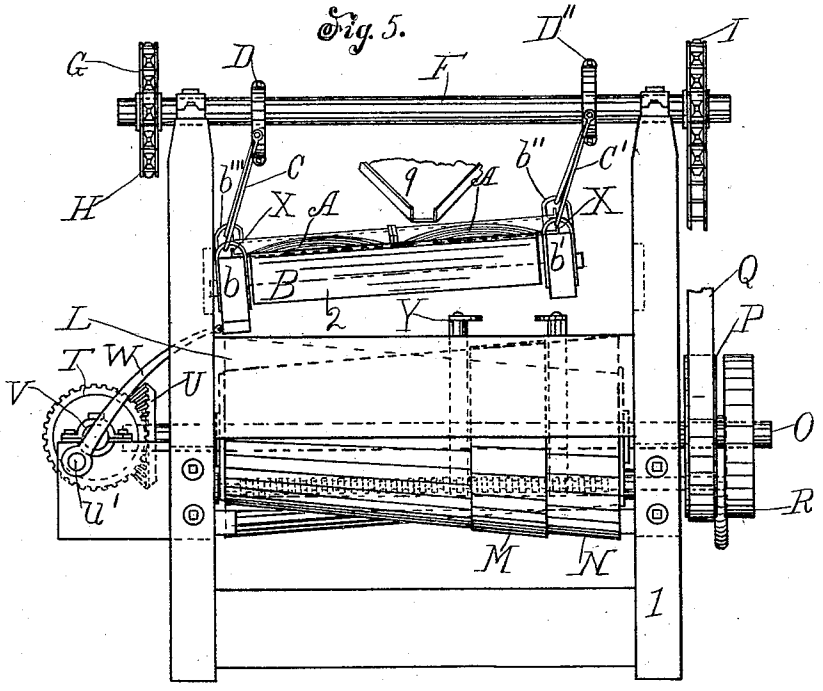
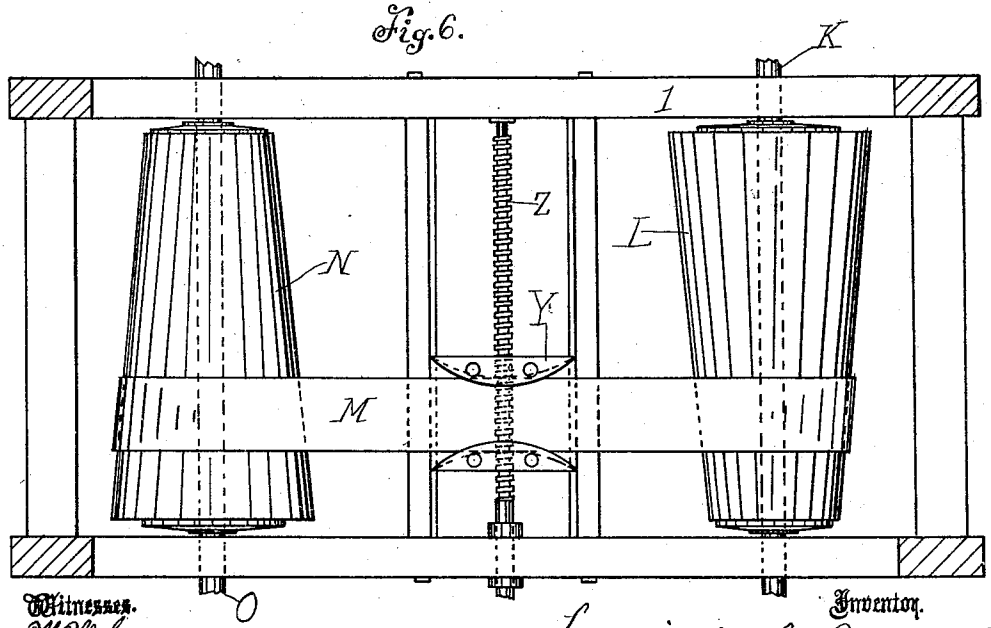


Fig. 6.



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UNITED STATES PATENT OFFICE.

LAVOISIER C. MORELAND, OF OGILBY, CALIFORNIA.

AMALGAMATOR AND ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 479,140, dated July 19, 1892.

Application filed May 2, 1891. Serial No. 391,439. (No model.)

To all whom it may concern:

Be it known that I, LAVOISIER C. MORELAND, a citizen of the United States, residing at Ogilby, in the county of San Diego and State of California, have invented a new and useful Amalgamator and Ore-Concentrator, of which the following is a specification.

The object of my invention is to construct a machine which will operate upon minerals in the separation of precious metals after the manner in which it is operated upon by the miner in the process called "panning," thereby enabling the separation to be made both by gravity and by quicksilver at the same operation.

The accompanying drawings illustrate my invention.

Figure 1 is a top view of my improved amalgamator and separator. Fig. 2 is a plain side view looking at the side shown at the bottom of Fig. 1. Fig. 3 is a plain elevation looking at the side shown at the left in Fig. 5. Fig. 4 is a longitudinal sectional view on line *x x*, Fig. 1, looking in the direction of the arrow. Fig. 5 is a plain elevation looking at the lower or discharge end of the machine. Fig. 6 is a detail of the belt-shifter and speed increasing and decreasing mechanism.

In Fig. 3 the eccentrics on the side shown are indicated in dotted lines, and Fig. 4 immediately beneath is designed, in connection with Fig. 3, to show the position of the several eccentrics relative to each other.

It is to be understood that the several views, except Fig. 5, show the machine as it appears before set in position in the mill, and that when placed in a mill it is to be set on a sloping floor or with the feed end slightly higher than the tail of the machine, as is usual with machines of this class, so that the water will flow toward the tail.

Fig. 5 shows a machine in such position, the rear or feed end being shown higher than the tail or discharge end, which is in the foreground.

The essential features of my machine consist in the combination set forth of table and pan tilting and oscillating mechanism and a table provided with a series of scoop-shaped pans deep at the rear and shallow at the front and having a flat mouth or discharge end and rounded sides and rear end and arranged with the grade of the bottom of the pan sloping downward toward the rear or feed end of the table, while the grade of the top of the pans and the table is sloping downward slightly toward the front or discharge end, whereby the heavy particles are retained in the deeper rear part of the pan, while the lighter substances, as sand, &c., will scour over and upon the rusty gold and the gold covered with arsenic and antimony, which collects upon the wide flat sloping front portion of the bottoms, thereby, by the successive action of the several pans, reducing the greater portion of the gold to a condition to amalgamate with the mercury, while that portion which does not amalgamate will settle to the deep rear portion of the bottom of the pan. The machine thus separates the gold both by mercury and gravity at one operation. The rear end and sides of the pan being rounded, there are no corners for the ore to become packed in, and the rounded walls also assist in agitating and scouring the particles of ore upon each other and upon the pan.

In practice my machine comprises a series of pans A, arranged upon a table or frame B, which is suspended by the table-suspending swings C C′, which depend from eccentric collars D, D′, D″, and D‴, mounted upon eccentrics E E′ E″ E‴, arranged in pairs, respectively, on the two supporting-shafts F F′, which are provided, respectively, with sprocket-wheels G G′, which are mounted, respectively, upon the shafts F F′ and are connected by the sprocket-chain H, so that the revolution of one will cause a corresponding revolution of the other. One supporting-shaft F′ is provided with a driven sprocket-wheel I, which is fixed upon such shaft and is connected with a driving sprocket-wheel J, fixed upon the driven pulley-shaft K, upon which is fixed the driven cone-pulley L, which is connected by a shifting-belt M with a driving cone-pulley N, fixed upon the power-shaft O, which is provided with the power-pulley P, driven by a power-communicating belt Q, arranged with a loose pulley R and shifter S to be thrown into and out of connection with

pulley P, as may be desired. The driven shaft K is operatively connected by suitable means—such as the bevel-wheels T U—with a crank-shaft V, having its cranks *u u'* connected with the pan-table B by the oscillator arms or pitmen W W'.

The pairs of eccentrics E E' and E'' E''' are arranged with relation to each other in such manner that the diagonally-opposite corners of the table are complementary to each other in their movements—that is to say, when one corner of the table, as *b*, is at its lowest point of movement, the oppositely-diagonal corner *b''* will be fully elevated and the other two corners *b'* and *b'''* will be respectively in their elevated and depressed position.

In practice the machine is set in motion by the belt Q, thus rotating the pulley-shafts O K, supporting-shafts F F', and crank-shaft V. A stream of water is allowed to flow upon the table through suitable means—such as the trough 9—and is conducted downward toward the tail of the machine, the flanges or walls X X preventing it from flowing off at the sides of the table. The pulverized mineral-bearing material is placed in the pans and the action of the water carries away the lighter material, while the heavy material will settle into the depressions or pans A. The lateral movement of the table caused by the oscillating arms W W' prevents the material from packing in the bottom of the pans. A quantity of quicksilver may be placed in the bottom of the pans, so that the gold will come into contact therewith and become amalgamated therewith. The constant movement of the table will cause the rusty and dirty gold to become scoured, so that the quicksilver can act upon it, while the water carries away all the lighter material.

The speed of the machine is regulated by shifting the belt M on the cone-pulleys.

Y is the belt-shifter. Z is the screw which moves it from side to side of the machine.

1 is the frame of the machine.

It is obvious other means than the sprocket wheels and chains and the belts and pulleys shown can be employed to rotate the shafts, and I do not wish to be limited to the exact form shown.

It will be understood that the machine may be provided with suitable feed mechanism; but it can be successfully operated when fed by shovels or other similar means, and as such devices do not form any part of my invention the same are not shown.

I do not limit myself to the use of the belt-shifter shown, and as no claim is made to the same I have not considered it necessary to describe it in special detail.

In practice the rusty gold covered with arsenic and antimony is saved by gravitation, and the flower-gold is saved by mercury. The pan being deep at the rear and shallow at the front, the grade of the bottom of the pan is toward the rear or feed end, while the grade of the top of the pan and table when in position is downward toward the front or discharge end. This causes the heavier particles of the pulp to gravitate backward toward the deep part of the pan, while the constant rotary, vertical, and vibrating motion of the pan causes the lighter particles—such as sand, &c.—to be washed toward the front over the rusty gold, thus scouring it so that the mercury can amalgamate the greater portion of the gold.

In my machine there is no longitudinal movement of the pans and pan-table. The machine is designed to agitate the ore thoroughly and to allow the water to carry off the finer and lighter particles, but not to assist in the removal of the particles of ore by any direct movement of the pan. In order to successfully accomplish this, it is necessary to shake both ends of the table up and down and to oscillate it laterally to prevent the ore from caking or packing in the bottoms of the pans.

Other means for shaking the pan-table up and down at each end and for oscillating it laterally may be employed without departing from my invention; and I do not limit my claims to the particular arrangement of the eccentrics shown.

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

1. The combination set forth of the table and pan tilting and oscillating mechanism, and the table provided with the series of scoop-shaped pans which are deep at the rear and shallow at the front, each having a flat mouth or discharge end and rounded sides and rear end and arranged with the grade of the bottom of the pan sloping down from the front to the rear, and the grade of the top of the pan sloping down from the rear to the front, substantially as and for the purpose set forth.

2. The combination set forth of the frame of the machine, the supporting-shafts F F', provided with the sprocket-wheels, the sprocket-chain H, connecting such wheels, the eccentrics E E' E'' E''', arranged in pairs, respectively, upon the two supporting-shafts, the eccentric collars D D' D'' D''', mounted upon such eccentrics, the table-supporting swings which depend from such collars, the table suspended by such swings and provided with the series of sloping-bottomed pans deep at the rear and shallow at the front, and means for oscillating the table and rotating the supporting-shafts.

3. The combination set forth of the pan-table, the supporting-shafts F F', the eccentrics arranged upon the shafts, the eccentric collars, the table-suspending swings, the sprocket-wheels G G', mounted, respectively, upon the supporting-shafts, the sprocket-chain connecting such sprocket-wheels, the

driven sprocket-wheel I, fixed upon one of the supporting-shafts, the driven pulley-shaft K, the sprocket-wheel J and cone-pulley L, fixed upon such pulley-shaft, the power-shaft O, the driving cone-pulley N, fixed upon the power-shaft, the crank-shaft V, operatively connected with the driven pulley-shaft K, and the oscillating pitman connecting the cranks of the crank-shaft with the pan-table.

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