

(No Model.)

3 Sheets—Sheet 1.

G. A. KENNEDY.
ORE AMALGAMATOR.

No. 535,801.

Patented Mar. 12, 1895.

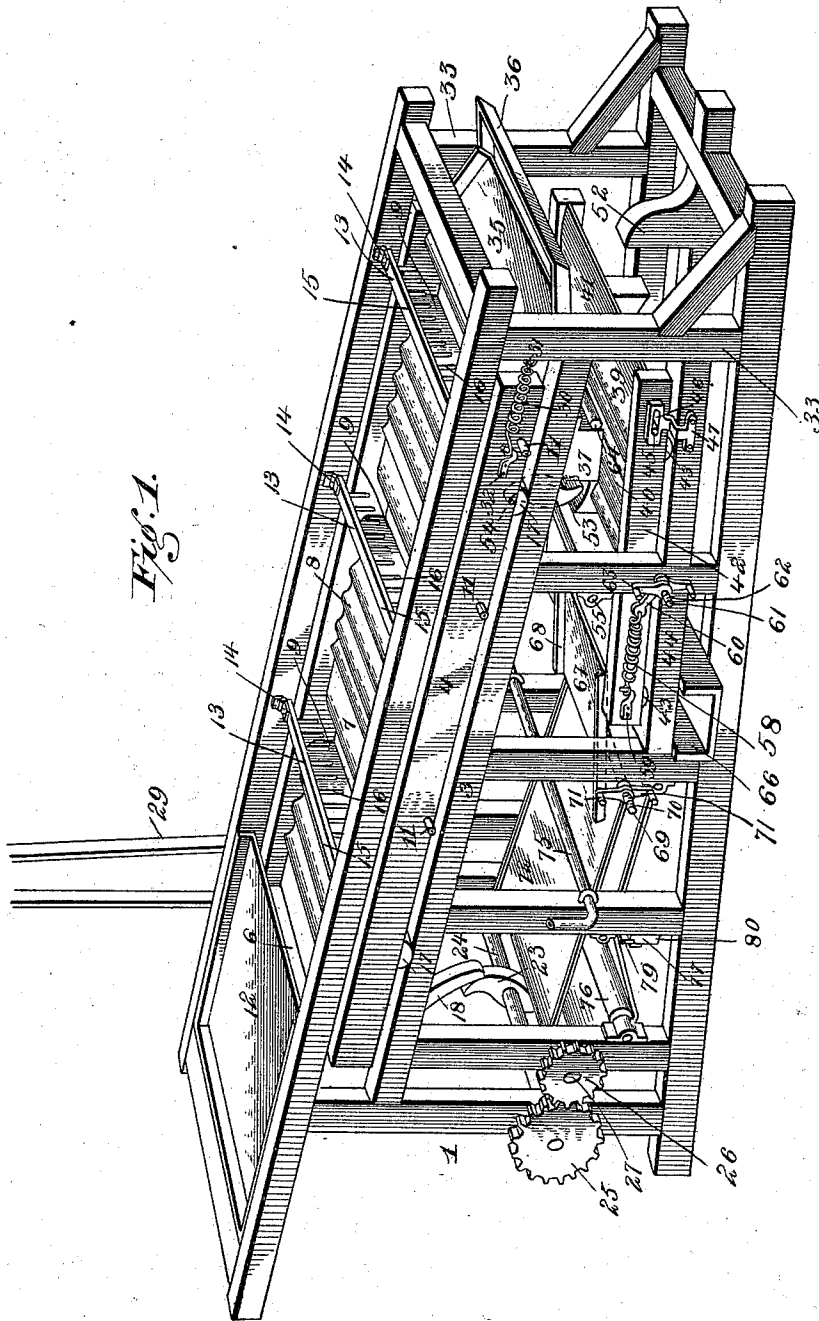


Fig. 1.

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Witnesses

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By *W. S.* Attorneys.

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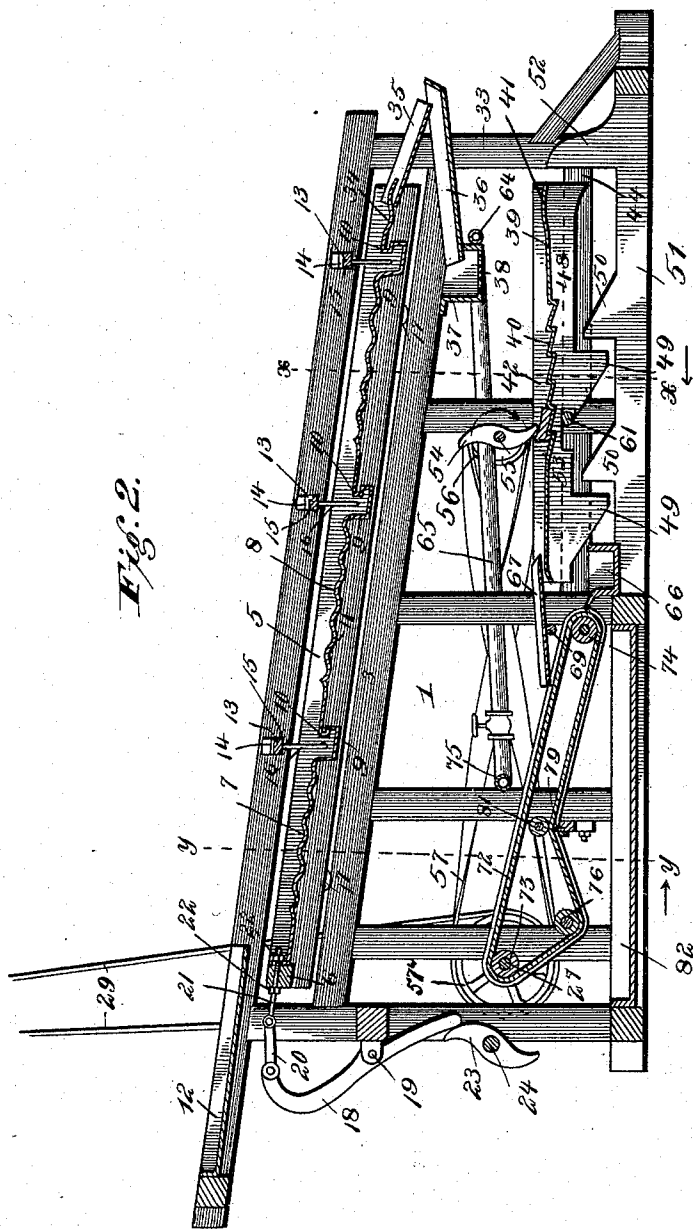
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Fig. 4.

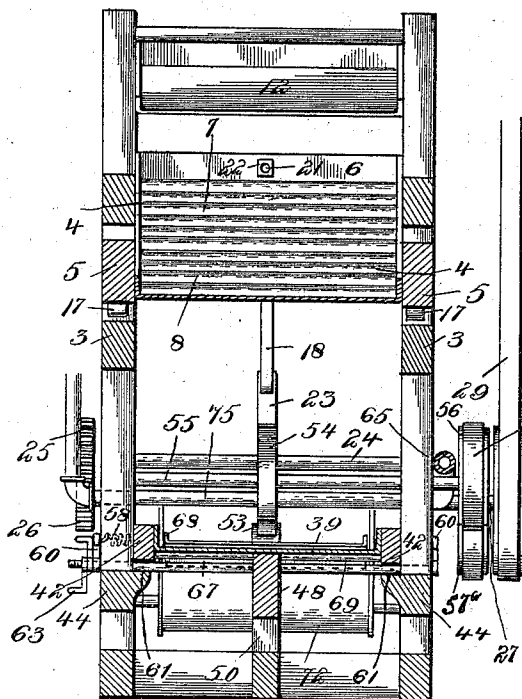


Fig. 5.

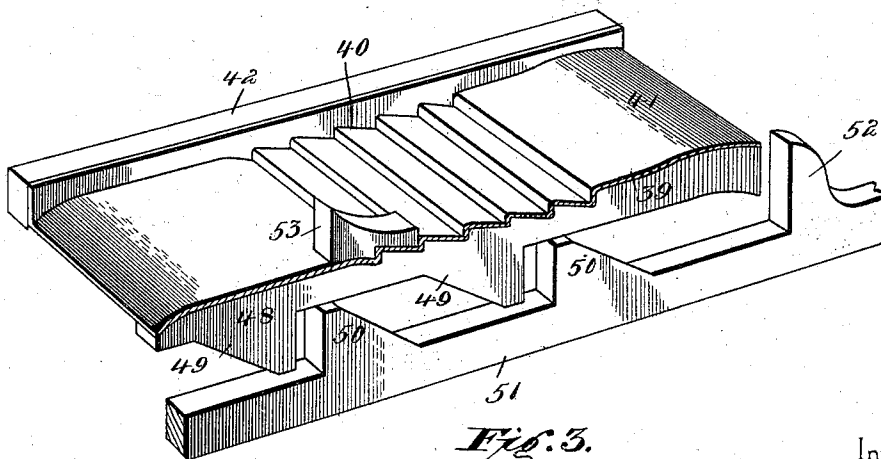
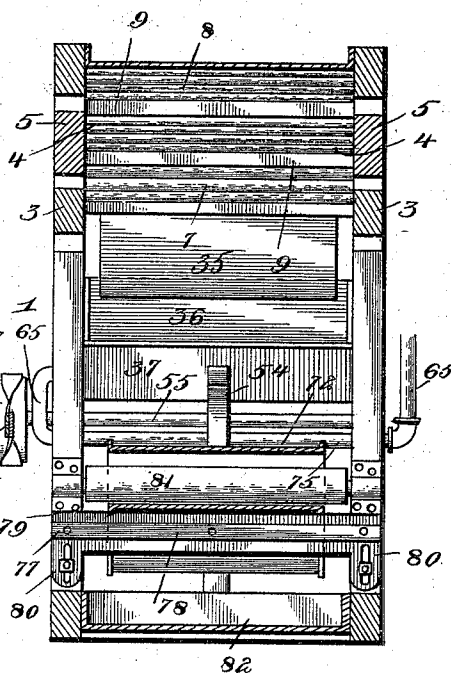


Fig. 3.

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UNITED STATES PATENT OFFICE.

GEORGE A. KENNEDY, OF DENVER, COLORADO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE KENNEDY AMALGAMATOR COMPANY, OF COLORADO.

ORE-AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 535,801, dated March 12, 1895.

Application filed March 14, 1894. Serial No. 503,628. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. KENNEDY, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Ore-Amalgamator, of which the following is a specification.

This invention relates to ore amalgamators of that class in which both an amalgamation and concentration of the ore are effected.

The primary object of the invention is to construct a machine of this character having simple and efficient means for thoroughly amalgamating and concentrating gold-containing ores, whereby a more thorough degree of amalgamation will be attained and a finer grade of concentrates secured than by the use of quicksilver machines heretofore patented.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the accompanying drawings:—Figure 1 is a perspective view of a combined amalgamator and concentrator constructed in accordance with this invention. Fig. 2 is a central vertical longitudinal sectional view thereof. Fig. 3 is a detail in perspective partly in section of the jarring concentrator. Fig. 4 is a transverse sectional view on the line $x-x$ of Fig. 2. Fig. 5 is a detail sectional view on the line $y-y$ of Fig. 2, the view being taken at one side of the slime scraper.

Referring to the accompanying drawings, 1 designates the frame of the machine consisting of a suitable base and uprights connected at their upper ends by frame pieces, and said frame has the upper part thereof supported at an incline, and is provided with the opposite inclined track rails 3, on which is mounted to reciprocate the movable amalgamating pan 4, the sides of which pan travel between the rails and the upper side bars of the frame immediately thereabove.

The amalgamating pan 4 consists of the opposite frame sides 5 connected at their upper ends by the end bar 6, and the intermediate amalgamated riffle plate 7. The riffle plate 7

is suitably fitted inside of the inclosing sides of the pan and is provided with a corrugated surface 8, forming superficial depressions adapted to contain a quantity of mercury that collects portions of the floating gold as the water and ore run over the said plate, and the latter is further provided at regularly spaced intervals with the enlarged mercury pockets or troughs 9, which extend below the plane of the corrugated surface of the riffle plate, and are partly inclosed at their lower upper edges with the upwardly extending and overhanging flanges 10, which serve to hold the gold collected in said pockets and prevent the same from working out before becoming amalgamated, and also serve to assist in agitating the water which rushes into the pocket as it flows together with the ore over the amalgamating plate. The enlarged mercury pockets 9, of the reciprocating amalgamating pan are also adapted to contain a quantity of mercury for the collection and amalgamation of the flour gold which floats around in the water that carries the same, and these mercury pockets may be readily cleaned through the faucet cleaning openings 11, formed in one side of the pan frame and opening into one end of the pockets.

The amalgamating pan 4, is fed with the water and mineral from the inclined feed table 12, fitted onto the upper higher end of the frame 1, and adapted to receive the water and mineral from the stamp mills, crusher, or other machine, and as this slush of water and ore runs into the upper higher end of the amalgamating pan, the same commences to pass in waves over the riffles of the amalgamating plate 7, and is partly relieved of the floating gold by the mercury contained in the depressions of such plate, and as the water and ore pass into the mercury pockets 9, and under the flanges 10, these flanges stop the rush of water, and cause the same to be agitated or sprayed upward and down over the main corrugated surface of the plate, and the backward motion given to the water by the flanges 10, will cause any particles of fine floating gold to be thrown to the bottom of the pockets 9, and in contact with the mercury contained therein.

The agitation of the water in the pockets 9, necessarily causes the same to be stirred up so as to thoroughly mix or commingle the ore with the water, and to assist the agitation of the slush I employ over each of the pockets 9, the agitators 13. The agitators 13, are hinged at one end as at 14, to one side of the frame above the amalgamating pan and consist of the bars 15, adapted to extend longitudinally over the pockets 9, and provided on their undersides with the depending agitating fingers 16, extending longitudinally of the said pockets and projecting thereinto, to provide means for keeping the sand or mineral in motion, so that the water can carry the same off and out of the amalgamating pan at the lower open end thereof.

The amalgamating pan serves to collect and amalgamate the floating gold, while the heavier ore or concentrate is discharged at the lower end of the pan, and the said pan is mounted for a reciprocating movement on the wheels 17. The wheels 17, are arranged on the amalgamating pan at opposite lower sides thereof and roll on the opposite inclined track rails 3, so that the said pan may freely move longitudinally in both directions, and the upward movement is imparted to the pan from the vibrating lever 18, pivotally mounted at a point intermediate of its ends in the pivot bracket 19, secured to one end of the frame 1, and the upper end of this lever has pivotally connected thereto one end of the swivel link 20, to the other end of which is connected the threaded adjusting bolt 21, projecting through the upper end bar 6, of the amalgamating pan, and engaged at both sides of this bar by the adjusting nuts 22, to provide means for taking up wear and for properly regulating the movement of the pan. The lower free end of the lever 18, is adapted to be engaged at intervals by the points of the double cam 23, mounted at a central point on the cam shaft 24, which shaft carries at one end the gear wheel 25 that meshes with a similar wheel 26, at one end of the roller shaft 27, at the other end of which shaft is mounted the band wheel or pulley 28, to receive the drive belt 29, which gives motion to the several working parts of the machine.

When the machine is in motion, through the medium of the gearing just described, the lever 18 is actuated to move the amalgamating pan in an upward direction, and when the cam 23, leaves the lever 18, the said pan is sharply moved in a reverse downward direction by the opposite pull springs 30. The pull springs 30 are secured fast at one end as at 31, to the frame uprights at the lower end of the frame and at their other ends are detachably and adjustably engaged with the hooks 32 secured to opposite sides of the amalgamating pan. The tension of the springs 30, is sufficient to sharply retract the lower opposite ends of the frame sides 5, against the upper ends of the strike posts or uprights 33, which form the lower end uprights of the ma-

chine frame, and as the pan is thus sharply jarred at intervals it will be obvious that the ore, or at least the heavy metals contained in the slush, are caused to settle close to the surface of the riffle plate and thereby be brought in contact with the mercury thereof, and this jarring motion therefore may be said to simulate a gravity motion that causes the particles of matter to settle.

The constant flow of water over the inclined amalgamating pan carries the unamalgamated ore or mineral out at the lower end thereof and over the lower discharge apron 34 formed by a lower extension of the plate 7, and this apron 34 projects over the upper end of the incline chute board 35, which directs the water and ore into the upper end of the reversely inclined discharging pan 36 that extends at a declination within the frame 1, under the lower discharging end of the pan 4, and delivers it to the closed distributing vat 37. The distributing vat 37 is suitably attached to the under side of the track rails 3, near the lower end of the frame and is provided with a perforated bottom 38, through which the water and ore are evenly distributed over the jarring concentrator plate 39.

The jarring concentrator plate 39, is preferably an amalgamated sheet of copper and is provided with a riffled or corrugated surface 40, that provides for catching and holding the particles of ore which may settle therein and are somewhat abrupt at one side to prevent the fine matter which settles therein from being jarred out to the front end of the plate, and the front end of said plate is upwardly and downwardly curved as at 41, to form an outer front discharge apron over which the heavy concentrates are discharged, as the concentrator is jarred.

The concentrator plate 39 is suitably mounted between the opposite frame sides of a suitable concentrator frame 42, which is constructed of material of suitable size and strength to withstand the jar placed thereon, and to opposite sides of the frame 42, are fitted the supporting rollers 43, which are arranged to roll on the opposite track rails 44, located at opposite sides of the frame just above the base portion thereof, and providing means together with the rollers 43, for supporting the concentrator for a longitudinal movement and jar, and to opposite sides of the concentrator frame near the outer front end thereof are secured the outwardly projecting guide pins 45, which work in the upper horizontally slotted ends 46 of the guide brackets 47 attached to and extending above the rails 44 near their front ends, and which not only serve to hold the concentrator frame steady in its reciprocation but also prevent the same from rising up when being jarred.

Rigidly attached centrally to the under side of the concentrator plate 39 and extending longitudinally thereof is the longitudinal jarring bar or beam 48, which is provided at different points with the downwardly projecting

shouldered strike lugs 49, which are adapted to be sharply moved against the opposing bumper lugs or stops 50, projected from the upper side of a stationary stop bar 51, arranged centrally and longitudinally under the jarring concentrator, and one of the lugs 52, arising from the bar 51, is higher than the other lugs and is adapted to receive in jarring contact there-against the outer front end of the bar 48, to complete means whereby the concentrator plate is evenly jarred throughout its entire length.

The concentrator plate 39, has attached to the top thereof at a central or intermediate point the inclined cam lug 53, against which is adapted to work the opposite arms of the double operating cam 54, mounted on the transverse cam shaft 55, which carries at one end the belt pulley 56, to receive the operating belt 57 which passes over the belt wheel 57^a, on the roller shaft 27, at one side of the band wheel or pulley 28 to provide means for rotating the said double cam in the direction indicated by the arrow. As the double cam 54, is rotated the opposite ends or points thereof alternately ride on and over the inclined side of the fixed cam lug 53, on the concentrator plate, and this necessarily causes the concentrator frame, which carries the plate, to move inward toward the center of the frame. The moment the cam 54 leaves the lug 53, the reciprocating concentrator is sharply retracted outward to bring the lugs carried thereby in jarring contact against the bumper lugs 50, and 52, and this movement of the concentrator is caused by the opposite pull springs 58, detachably connected at one end to the engagement hooks 59, at opposite sides of the concentrator frame and connected at their other ends to the adjusting arms 60, mounted on opposite ends of the transverse tension shaft 61. The transverse tension shaft 61, is journaled in suitable bearings transversely of the machine frame under the reciprocating concentrator and is threaded at one end as at 62, to receive the lever jam nuts 63, which hold the tension shaft stationary in its adjusted position after regulating the tension of the pull springs 58.

While the unamalgamated matter together with water is evenly distributed onto the jarring concentrator plate, from the distributing vat or box 37, an additional quantity or supply of water is thrown onto the concentrator plate from the transversely arranged perforated jet pipe 64, located at one side of the distributing vat and arranged in the line of a water supply pipe 65, and the water and ore thus distributed onto the concentrator table undergo a thorough concentration thereon by reason of the jarring of such table. This motion being stronger and quicker than that of the amalgamating pan 4, causes the heavier concentrates to move forward from the inner end of the concentrator plate out to the front outer discharge apron 41, while other finer concentrates settle into the riffles of the plate

and the tailings work over the inner end of the plate into the transversely arranged tailings box or trough 66, located at the base of the machine frame under the inner end of the reciprocating jarring concentrator. Other slime concentrates float on the water as the same runs over the concentrator plate 39 and into the tailings box or trough 66, and such concentrates are collected by the slime skimmer 67. The slime skimmer 67, consists of a thin metallic plate flanged at its ends as at 68, and mounted on the transverse adjusting shaft 69, journaled transversely of the frame 1 beyond the inner end of the concentrator frame and threaded at one end as at 70, to receive the lever jam nuts 71, which provide means for holding the shaft adjusted at the proper angle. The slime skimmer 67, is adjusted to have one end thereof fit within one end of the concentrator frame 42, directly above the inner discharging end of the concentrator plate, so that this inner end of the skimmer will serve to skim the slime concentrates that float on the water as it passes over the concentrator plate toward the lower inner end of the endless slime carrier 72.

The endless slime carrier 72, consists of a suitable endless cloth belt, the top portion of which is preferably arranged at an incline, and passes over the opposite belt rollers 73 and 74, the former of which is mounted on the roller shaft 27, and serves to transmit motion to the belt or carrier in the direction indicated by the arrow, while the roller 74, is journaled in suitable bearings under the slime skimmer 67, in a lower plane than the roller 73, and beyond the inner discharging end of the concentrator.

Water is fed onto the endless slime carrier 72, transversely of the same at an intermediate point from the perforated jet pipe 75, which serves to wash the slime concentrates which are directed thereon by the slime skimmer 67, and the lower portion of the endless slime carrier is arranged to pass over an idler roller 76, and a slime scraper 77, adjustably arranged under and in contact with the under portion of the belt at an intermediate point. The slime scraper 77, consists of a scraper bar 78, carrying a rubber scraper flange or strip 79, set therein, and opposite slotted attaching arms 80, adjustably fitted to opposite uprights of the machine frame.

The slime scraper is adjusted against the under portion of the endless carrier directly under an idler retaining roller 81, which is arranged inside of the carrier directly over its under portion to hold the same onto the scraper, so that the latter will completely scrape off the slime concentrates into the slime box 82 built on the base of the frame directly under the lower portion of the carrier elevated by the scraper 77.

The operation of the herein described machine has already been detailed, and it will be obvious that the means provided will insure a thorough amalgamation of the ores so

as to more effectually collect and save a large quantity of the float gold, while at the same time insuring the collection of finer concentrates than has been heretofore possible, and I will have it understood that changes in the form, proportion and the minor details of construction, may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In an amalgamator, the combination of a frame having an inclined track, immediately below the upper side bars thereof strike posts at the lower end of the track, a wheeled amalgamating pan arranged to roll on said track under the upper side bars of the frame and provided with a riffled amalgamating plate having a series of transverse mercury pockets and overhanging flanges at the lower upper edges of said pockets, a series of transverse agitator bars hinged at one end to a stationary part of the frame above the pan and provided with a longitudinal series of fingers projecting into the mercury pockets, an adjusting device for said pan, means for moving the amalgamating pan in an upward direction, and springs adapted to retract the lower ends of the pan against said strike posts, substantially as set forth.

2. In an amalgamator, the combination of the frame having an inclosed inclined track and strike posts at one end, the wheeled amalgamating pan arranged to reciprocate at an angle within the inclosed track said frame and having side hooks near its lower end, a vibrating lever pivoted at an intermediate point at one end of the frame, an adjustable connection between the upper end of such lever and the high end of the amalgamating pan, a suitably arranged rotating cam shaft carrying a double cam adapted to engage the lower end of said lever, and pull springs detachably and adjustably connected at one end to the side hooks of the pan near its lower end and to one end of the main frame to normally draw or retract the pan against said strike posts, substantially as set forth.

3. In a machine of the class described, the combination with the frame; of the amalgamating pan arranged at an angle at the top of said frame, a concentrator mounted within the frame and adapted to receive the discharge from the amalgamating pan, a slime carrier mounted within said frame beyond the concentrator, and means for transferring the floating slime concentrates from the concentrator onto said carrier substantially as set forth.

4. In an amalgamator and concentrator, the combination of a reciprocating jarring amalgamating pan arranged to work at an angle, a similarly moving open ended concentrator arranged horizontally and adapted to receive the discharge from the amalgamating pan,

means for jarring the concentrator to discharge matter from both open ends and a slime carrier located beyond one discharging end of the concentrator, substantially as set forth.

5. In a machine of the class described, the combination with the frame; of the amalgamating pan arranged to reciprocate at an angle within said frame, means for jarring said amalgamating pan, a reciprocating concentrator plate arranged within the frame, means for jarring said concentrator plate, a distributing vat arranged transversely over the concentrating plate between its ends and provided with a perforated bottom, a perforated jet pipe arranged at one side of said vat, reversely inclined discharge chutes arranged under the lower discharging end of the amalgamating pan and discharging into said distributing vat, a slime carrier arranged beyond the concentrating plate, and a jet pipe arranged over the slime carrier substantially as set forth.

6. In a machine of the class described, the combination with the frame, and the amalgamating pan mounted to reciprocate within the frame; of a wheeled concentrator open at both ends and mounted on said rails and provided with a fixed concentrator plate having a riffled or corrugated surface intermediate of its open ends and upwardly and downwardly curved at its smooth front outer end to form a discharge apron, a distributing vat arranged transversely over the concentrator to feed the same with ore and water, a supplemental perforated jet pipe arranged over the concentrator, means for reciprocating said concentrator, in one direction, and adjustable spring devices for moving and jarring the same in the opposite direction, substantially as set forth.

7. In a machine of the class described, the combination with the frame having a track; of the wheeled concentrator frame mounted to roll on said track and carrying a concentrator plate, an inclined cam lug attached at an intermediate point to the top surface of the concentrator plate, a double cam mounted to rotate against said cam lug, a stationary stop bar arranged longitudinally under the concentrator and provided with a series of bumper lugs or stops, a longitudinal jarring bar or beam attached rigidly to the under side of the concentrator plate and provided with a series of strike lugs adapted to engage against said bumper lugs or stops, opposite guide brackets for the concentrator frame, a suitably arranged transverse adjustable tension shaft having adjusting arms at its opposite ends, and pull springs attached to said adjusting arms and to opposite sides of the concentrator frame, substantially as set forth.

8. In a machine of the class described, the combination with the amalgamating and concentrating devices; of a suitably mounted slime skimmer arranged to collect the slime

concentrates from the concentrating device, an inclined endless slime carrier arranged below and beyond the skimmer, and a slime scraper arranged in contact with an intermediate under portion of said carrier, substantially as set forth.

9. In a machine of the class described, the combination with the frame and the concentrator plate mounted for agitation in said frame; of a transverse adjusting shaft mounted on the frame near one end of the concentrator plate and provided with suitable adjusting means, a slime skimmer plate mounted on said adjusting shaft and having one end disposed over one end of the concentrator plate to collect the slime concentrates, an endless cloth slime carrier arranged at an angle below and beyond the skimmer plate, a perforated jet pipe arranged over said carrier and a slime scraper arranged in contact with

the central under portion of said carrier, substantially as set forth.

10. In a machine of the class described, the combination with a concentrator plate; of a slime skimmer arranged at one end of the plate, an inclined endless slime carrier arranged under and beyond said skimmer, a vertically adjustable slime scraper having a rubber scraper flange or strip held in contact with a central elevated under portion of said carrier, and an idler retaining roller arranged inside of the carrier directly over said scraper, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE A. KENNEDY.

Witnesses:

FRANK E. MILLER,
W. H. REYNOLDS.