

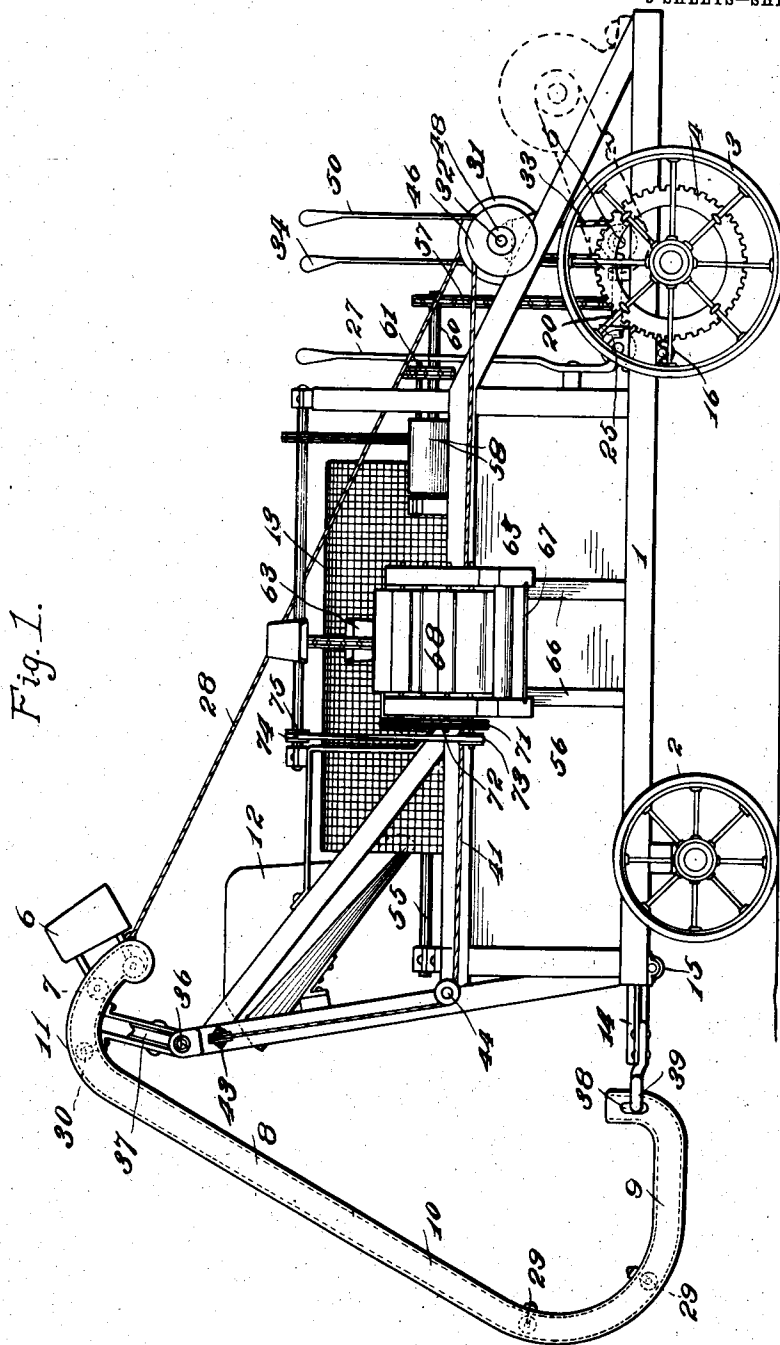
No. 834,613.

PATENTED OCT. 30, 1906.

J. GOTTLANDER.
ORE SEPARATOR.

APPLICATION FILED NOV. 20, 1902.

5 SHEETS—SHEET 1.



WITNESSES:

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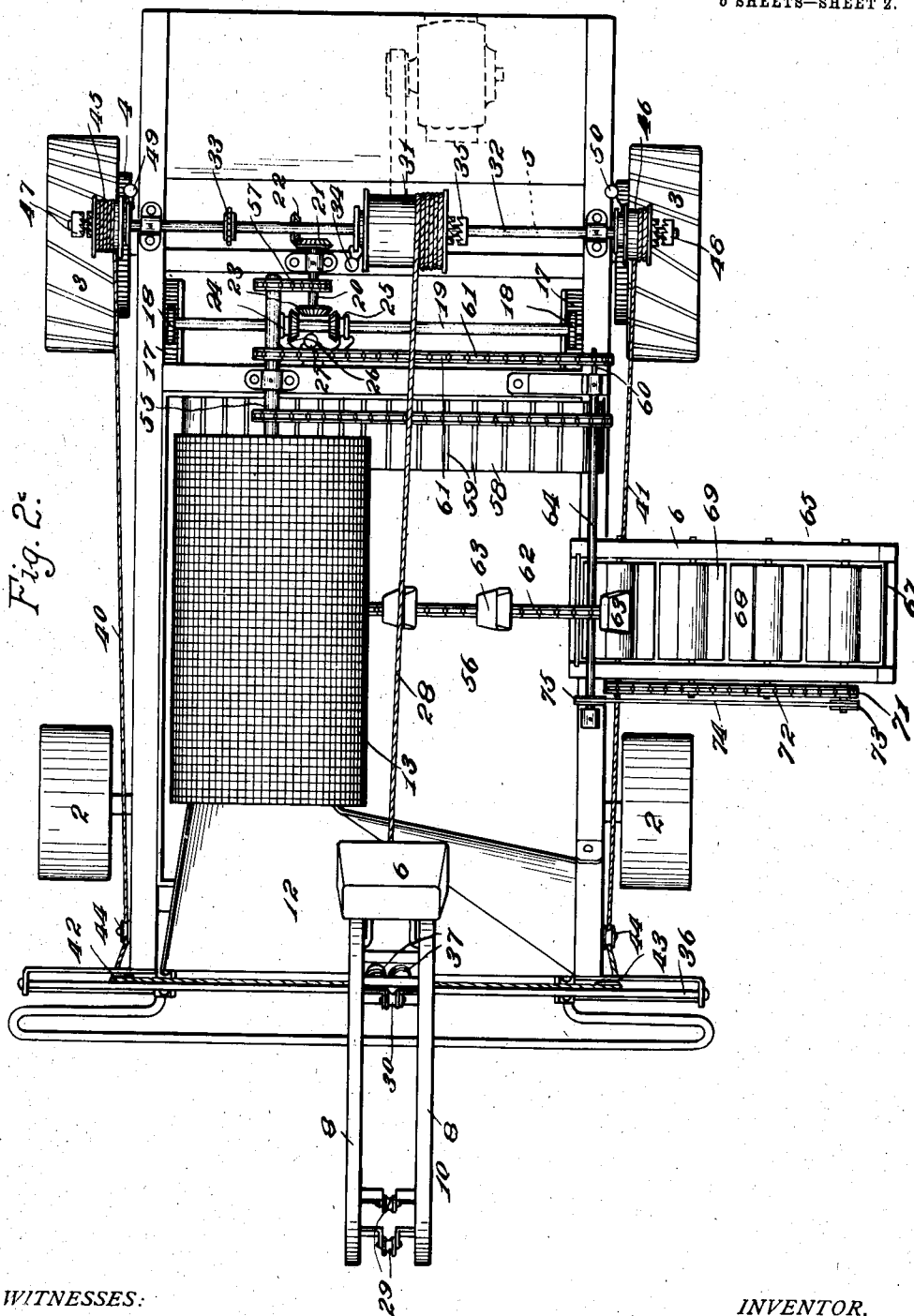
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5 SHEETS—SHEET 2.



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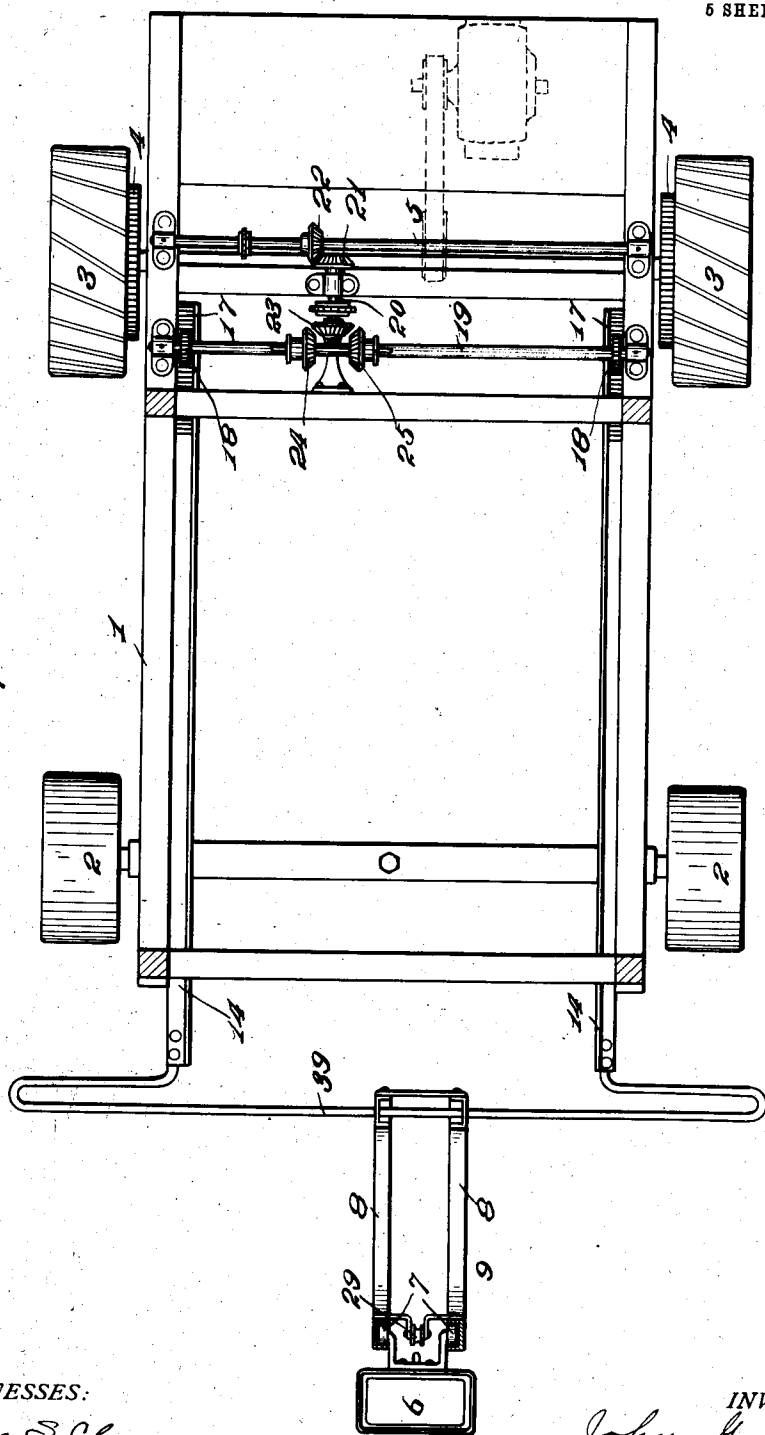
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5 SHEETS—SHEET 3.

Fig. 3.



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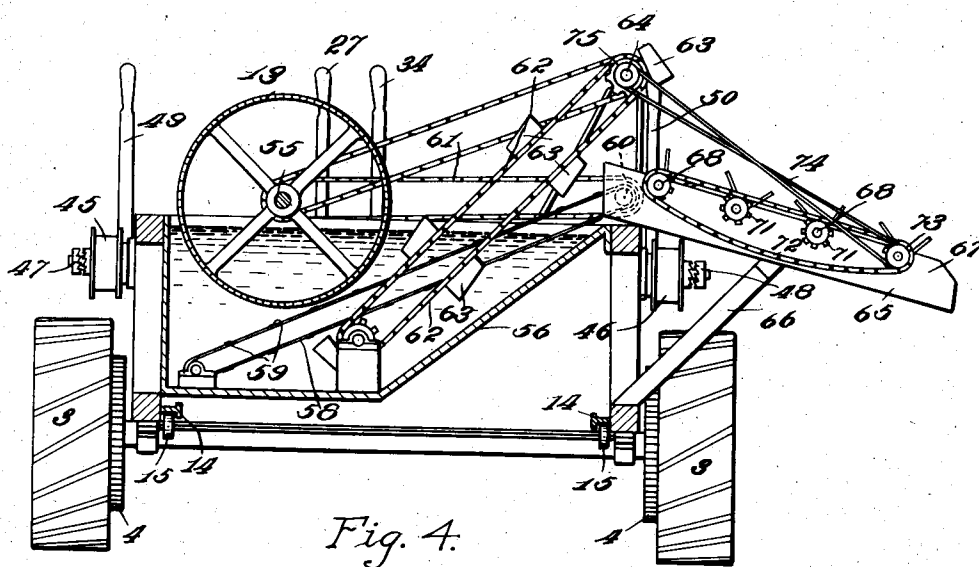
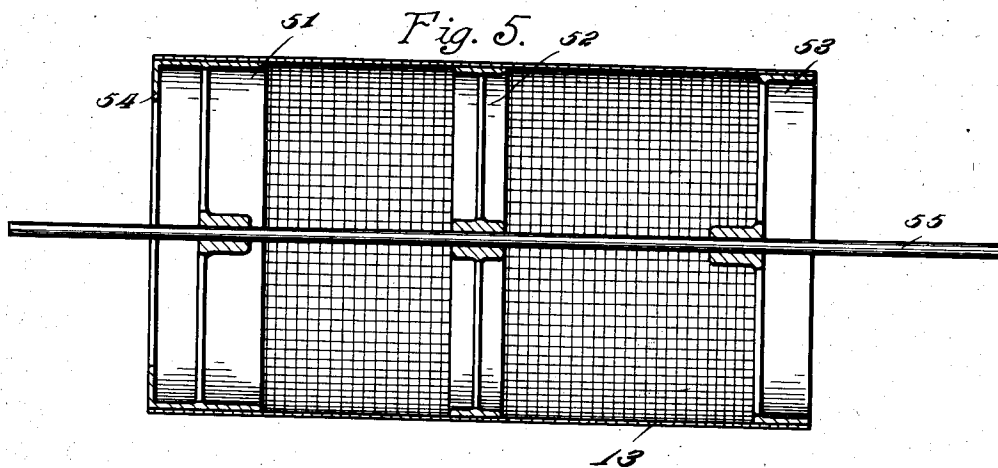
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5 SHEETS—SHEET 4.



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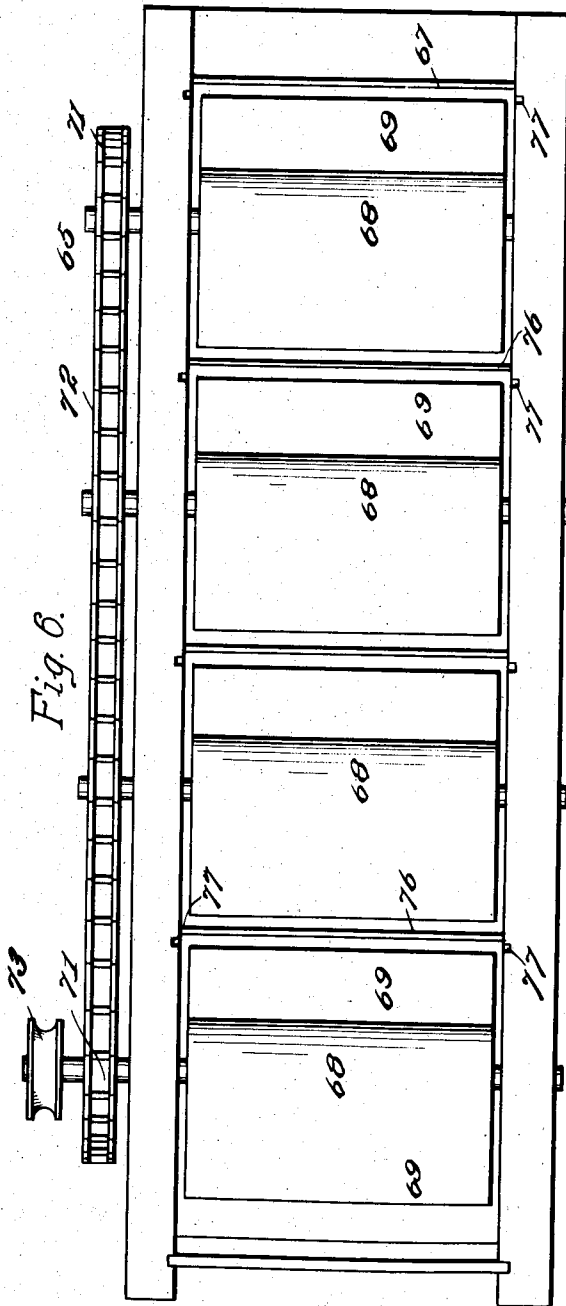
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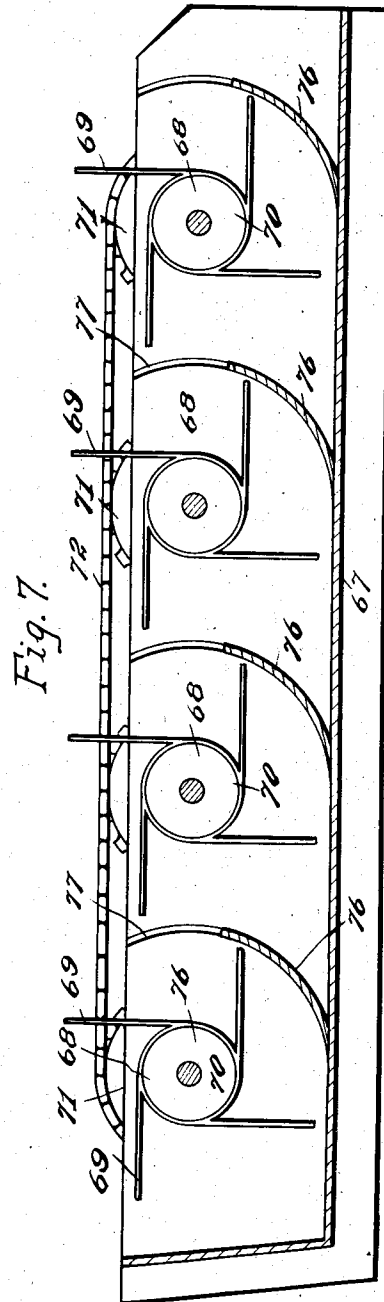
6 SHEETS—SHEET 5.



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No. 834,613.

Specification of Letters Patent.

Patented Oct. 30, 1906.

Application filed November 20, 1902. Serial No. 132,086.

To all whom it may concern:

Be it known that I, JOHN GOTTLANDER, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Ore-Separators; 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 improvements in machinery for collecting and extracting gold from ores, and has especial relation to what is known as "placer-mining," in which a large quantity of fine flour-gold is met with, which generally has a tendency to float upon the surface of the water during the usual methods and operations pursued for separating such gold from gravel and earth.

The object is to produce a machine which shall be more or less automatic in its action throughout and which shall be capable of propelling itself from place to place and is able to do its own excavating of the material to be worked, sifting and washing the material, as well as amalgamating both the flour-gold and coarse gold which may be contained in such material.

It consists in a separator provided with an excavator adapted to be raised and lowered, a sliding support carrying the said excavator for drawing it toward the machine when ready to operate, and means for forcing the same outwardly to carry the excavator back against the material to be raised, and thereby insuring the thorough accomplishment of its work.

It also consists in a separator provided with means for excavating placer material and a revolving screen for receiving the same, the said screen revolving partially in water, so that the gold-containing material will be sifted beneath the surface of the water, whereby a small quantity of water can be used effectually for accomplishing the separating process.

The invention also consists in a separator provided with an amalgamating means, consisting in a trough, a series of paddle-wheels mounted therein, and a series of riffles arranged to partially fit around the paddle-wheels, the blades of the paddle-wheels and the riffles being coated with an amalgamating material, so that the fine as well as the

coarse gold passing through said amalgamator will be thoroughly taken up.

It also consists in certain other novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a machine embodying this invention. Fig. 2 is a top plan view of the same. Fig. 3 is a plan view of the base-frame of the machine, the upper parts thereof being removed for a clearer disclosure of the sliding frame which carries the excavator. Fig. 4 is a transverse vertical section through the machine. Fig. 5 is a longitudinal central section through the revolving screen used in this machine. Fig. 6 is a top plan view of the amalgamator. Fig. 7 is a central longitudinal section through the same.

In mining for gold, especially in placer-mining, there is often a considerable quantity of very fine gold, commonly called "flour-gold," which has a tendency to float upon the top of water used in separating the gold from gravel, rock, earth, or other material with which it may be found mixed in such mining. By the present invention I am enabled to excavate material carrying such gold and to screen it beneath the water, so as to quickly separate it without using a large quantity of water and also to insure the catching of all of the flour-gold as it passes through the amalgamator.

The machine is formed with a suitable base, as 1, which is preferably supported upon wheels, as 2 and 3. The wheels 3 are preferably in the form of drive or traction wheels, by which the vehicle may be propelled from place to place, and for this purpose such wheels are provided with the usual driving-gears, as 4, which may be connected by any suitable train of gearing with a suitable steam, gas, or other engine or electric motor, as may be desired. Such engine or motive power has not been illustrated, as it forms no special feature of the invention. The different mechanisms carried by the machine are driven by a main driving-shaft 5, mounted upon the frame 1, preferably at a point near the traction-wheels, so that it can readily receive its power from the engine or motor above referred to.

At the forward end of the machine is an excavating or digging apparatus, which preferably consists of an excavating-bucket 6,

carried by suitable rollers, as 7. The rollers of the bucket are guided in their movement by runways 8, preferably formed of channel-irons, which have their flanges facing each other and are separated a suitable distance to receive the framing, which carries the excavating-bucket, between them. The runways 8 extend forwardly in a horizontal plane a short distance in front of the machine, as at 9, and are then curved upwardly and backwardly toward the machine at 10, while at the highest point they are curved from the front edge of the machine, as shown at 11. The excavating-bucket 6 when in its lowered position can thus be caused to travel forwardly along the ground until it is filled with ore-containing material, after which it will be raised and caused to travel upwardly over the upper edge of the machine and will be turned upside down, as shown in Fig. 1, so as to dump its contents into a trough 12, which collects the material thus deposited in the machine and delivers it to a rotating screen 13. The runways 8 are so mounted that the excavating-bucket can be moved laterally with respect to the machine as well as longitudinally thereof, the runways themselves being moved in this manner to effect such operation of the bucket. To move the runways longitudinally of the machine, they are mounted upon a sliding frame 14, which is preferably formed of T or other irons arranged within the base-beams of the frame 1 on each side thereof and sliding upon anti-friction-rollers 15 and 16, carried by the said frame. The rear ends of these irons are formed with a series of rack-teeth, as 17, for a short distance, which will engage pinions 18, secured upon the ends of a cross-shaft 19. This shaft is arranged counter to the main shaft 5 and is capable of receiving motion therefrom through a suitable train of gearing. This gearing preferably consists of an intermediate shaft 20, arranged at right angles to the shaft 19 and connected, by means of beveled gears 21 and 22, with the said main shaft 5. The shaft 20 also carries a beveled gear 23, which is arranged to actuate either a sliding gear 24 or a similar sliding gear 25, carried by the shaft 19. These sliding gears are splined to the shaft 19, so as to turn the same, and are moved by means of a yoke 26, which engages annular flanges upon said gears and is operated by a suitable lever, as 27, so that one or the other of the gears may be brought into contact with the actuating-gear 23 of the shaft 20. By this mechanism the shaft 19 can be quickly rotated in one direction or the other for moving the sliding frame 14 in and out. This is a very desirable feature of the machine, since after the excavating-bucket has been raised it could not well be lowered again without retracting the frame, because of the falling of material behind the bucket in the excavation. The

movement of the frame also facilitates the forcing of the bucket against the material which is to be excavated after the bucket has been lowered again. When the bucket has been brought to its lowest position, the shaft 19 is so rotated that the frame 14 is forced outwardly, carrying with it the runways 8 and the bucket 6. The bucket is further moved forward along the runways by means of a cable 28, which is attached to the bucket and which runs over guide-pulleys 29 near the lower part of the runways 8 and a pulley 30 near the top of said runways. The cable extends backwardly to a winding-drum 31, secured to a shaft 32, mounted on the frame of the machine above the main driving-shaft 5. This shaft 32 is connected with the driving-shaft by means of a sprocket-chain 33, which leads to the sprocket-wheels upon the respective shafts 5 and 32. A lever 34 is employed for moving the drum into and out of engagement with a clutch 35 upon the said shaft 32, so that the movement of the bucket can be controlled completely.

In order to increase the range of the excavator, the runways 8 are so mounted that they may be moved from side to side upon the machine. For this purpose an upper rod or track 36 is employed, which is engaged by one or more grooved pulleys 37, secured to the under side of the runways 8 at the upper end thereof. The lower ends of the runways are provided with vertical slots 38, which engage a guiding-rod 39. The rod 39 is extended beyond the wheels of the machine at each side and is folded back so as to be connected with the ends of the sliding frame 14. The top rod or track 36, upon which the weight of the runways rests, also extends beyond the wheels of the machine, so that the excavator can get at material in front of the machine for a space greater than its width. The excavating mechanism is moved from side to side upon the frame of the machine by means of cables 40 and 41, which extend from the excavator-frame over pulleys 42 and 43 at the side of the machine and thence downwardly around pulleys 44 to drums 45 and 46, carried by the shaft 32. These drums are loose upon the said shaft, but may be caused to turn therewith by moving them into and out of engagement with clutches 47 and 48 by means of hand-levers 49 and 50.

When it is desired to move the excavator toward one side of the machine, the drum 45 or 46 upon that side of the machine is thrown into engagement with the shaft 32, and the said excavator can be moved in that direction as far as desired. It can also be moved again in the reverse direction by throwing the opposite drum into operation. Of course as one drum winds up the cable the other drum will permit its cable to pay out. By mounting the excavator in the manner described and connecting it with the mech-

anism set forth it is entirely within the control of an operator and can be made to clear the space in front of the machine as the work of separating ore from materials continues.

5 The chute 12, which receives the material discharged by the excavator-bucket 6, carries the said material into the open end of the screen 13. This screen is preferably constructed as shown in Fig. 5, being formed of
10 a series of spiders 51, 52, and 53. The spiders 52 and 53 are comparatively narrow; but the spider 51 is formed with a periphery which is quite wide, so that the materials falling into the screen from the chute 12 will
15 not batter and wear the mesh of the screen. The spider 51 is also provided with an inwardly-extending annular flange 54, which prevents material from jumping out of the screen as it falls into the same. The shaft 55
20 of the screen is mounted in suitable bearings on the frame, the said shaft preferably extending longitudinally of the machine and suspending the screen above a tank 56,
25 formed within the body portion of the machine. The shaft 55 of the screen is connected, by means of a sprocket-chain 57, with the shaft 20, from which it receives its motion. Water is maintained at a suitable
30 level in the tank 56 to submerge a portion of the screen, as shown in Fig. 4, so that the materials screened are operated upon beneath the surface of the water. As the screen revolves, the fine particles of gold and
35 sand fall through the mesh of the screen into the tank 56 and accumulate in the bottom thereof. The coarse materials will not fall through the mesh of the screen, but pass out the end of the screen which is farthest from
40 the chute 12, for this end of the screen is not provided with a flange, as is the other end, and these heavy and large materials fall upon an endless conveyer or belt 58, which is arranged transversely of the machine and extends
45 from a point near one side thereof in the bottom of the tank to the upper end of the machine at the opposite side thereof. This belt 58 may be formed with a series of slats or riffles 59, which tend to hold materials which drop upon the belt upon the same,
50 so that they will be carried upwardly and over the side of the machine. An actuating-shaft 60 is connected, by means of a sprocket-chain 61, with the shaft 55 of the screen and receives its motion therefrom.

55 The material which collects in the bottom of the tank 56 is hoisted therefrom by a conveyer 62, which preferably consists of a chain carrying a series of buckets 63. The conveyer is so mounted that its lower end extends to a point near the bottom of the tank 56, while its upper end is carried by a shaft 64, supported above the side of the machine, and the buckets carried by the said belt therefore descend to the bottom of the tank
56 and lift the material contained in the said

bottom to a point above the side of the separator. The buckets are arranged to discharge into the trough of an amalgamator 65, which rests at its upper end upon one edge of the machine, while its other end projects
70 outwardly therefrom and is supported by a suitable brace or standard 66. The amalgamator-trough is arranged at a suitable angle with respect to the machine, as shown in Fig. 4.

75 The construction of the amalgamator forms an important feature of the invention. It is made up of an elongated inclined trough 67, in which are arranged a number of paddle-wheels 68, extending transversely of the
80 trough. These paddle-wheels are formed with a series of paddles 69, which project tangentially from a central drum-shaped hub 70 of suitable diameter, as shown in Fig. 7. The shafts of the paddle-wheels project be-
85 yond the sides of the trough 67 and are provided with sprocket-wheels 71, which are all connected and simultaneously operated by a sprocket-chain 72, so that all the paddle-wheels are moved positively and in unison.
90 The shaft of one of the paddle-wheels carries a pulley 73, which is connected, by means of a belting or cable 74, with a pulley 75 upon the shaft 64 of the conveyer 62. Coöperating
95 with each of the paddle-wheels is a curved riffle-plate 76, which extends upwardly from the bottom of the trough 67 around each of the said paddle-wheels and forms a pocket for retarding the outward flow from the
100 trough of water to the particles therein, so as to give the revolving paddles ample time to act upon all of said particles. These riffles are adjustable therewith toward the bottom of the trough for the purpose of accelerating or
105 retarding the discharge of the liquid, &c., from the pockets and removable to permit deposits to be readily taken from them. To render the riffles removable and adjustable, they are mounted in curved grooves 77,
110 formed in the side walls of the trough 67. The surfaces of the paddle-wheels and their hubs, together with the inner surfaces of the riffles and the inner surface of the trough 67, are preferably covered with copper which is coated with quicksilver in the usual way.
115 As the material is hoisted from the trough 56 by the conveyer 62 it is discharged into the upper end of the amalgamating-trough 67. The paddle-wheels then carry the material successively over the riffles 76, at the same
120 time exposing to any loose particles of gold that may be in the water and material coming into the amalgamator the coated surfaces of the paddles upon the paddle-wheels, as well as of the cylindrical hub portions. The
125 material is thus forced successively beneath each paddle-wheel and carried upwardly over the riffles 76, and before the material is discharged at the lower end of the chute or
130 trough 67 all gold, whether flour or coarse,

will be taken up by the quicksilver coating the surfaces of the paddle-wheels and trough. By the use of the paddle-wheels any connection with the riffles 76 insures the collection and amalgamation of even the fine particles of flour-gold which ordinarily fall upon the water, for the paddles will engage such and either collect it with their coated surfaces or will carry the same downwardly through the water and force it against the amalgamating-surfaces of the riffles 76. It will be thus apparent that the amalgamating process is exceedingly thorough and that no particles of gold because of their fineness and lightness can escape collection by the amalgamating-surfaces of the chute or trough.

By forming the inclined troughs 67 with a flat bottom and employing adjustable and removable riffles the trough can be thoroughly washed by either raising or removing the riffles and directing a sheet of water over the flat bottom from end to end. As the paddles 69 are arranged tangentially to their hubs, they swing successively downward upon and into the water in the trough and tend to draw it and any material therein toward the hubs of the paddle-wheels. The contact of all solid particles with either the paddles of the riffles is thus insured.

It will be evident from the above description that a machine constructed in accordance with this specification is admirably adapted for use in the fields of placer-mining and that it is capable of taking up the material itself and screening, separating, and amalgamating the valuable particles which may be contained therein, all within the control of the operator or overseer of such mechanism.

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

1. In a separator, a wheel-supported frame, an excavator-support mounted thereon, an elevator-base mounted on the support and arranged for movement laterally throughout substantially the entire width of the frame, a tank upon the frame, a rotating screen within the tank, a chute secured upon the frame and proportioned to receive material from the excavator in any lateral position and direct it to the screen, an amalgamator mounted upon the frame, and means to convey material from the tank to the amalgamator.

2. In a separator, a wheel-supported frame, an excavator-support mounted thereon, an excavator mounted upon the support and arranged for movement laterally throughout the width and beyond the lines of the frame, means to move the excavator, a tank upon the frame, a rotating cylindrical screen within the tank, a chute secured upon the frame and having a hopper proportioned to receive material from the excavator in any lateral

position and direct it to the screen, an amalgamator mounted upon the frame, and means to convey material from the tank to the amalgamator.

3. In a separator, a wheel-supported frame, an excavator mounted upon and arranged for movement laterally throughout the width of the frame, means to move the excavator, a tank upon the frame, a rotating cylindrical screen within the tank, a chute secured upon the frame and having a hopper proportioned to receive material from the excavator in any lateral position and direct it to the screen, an amalgamator mounted upon and extending beyond the lines of the frame, and means to convey material from the tank to the amalgamator.

4. In a separator, a frame, an excavator mounted upon and arranged for reciprocatory movement laterally of and beyond the frame at each side, a tank upon the frame, a rotating screen within the tank, a chute secured upon the frame and proportioned to receive material from the excavator in any lateral position and direct it to the screen, an amalgamator mounted upon the frame, rotating mercury-covered paddle-wheels within the amalgamator, and means to convey the material from the tank to the amalgamator.

5. In a separator, a frame, an excavator mounted upon and arranged for reciprocatory movement laterally throughout the width of the frame, means to move the excavator, a tank upon the frame, a rotating screen within the tank, a chute secured upon the frame and having a hopper proportioned to receive material from the excavator in any lateral position and direct it to the screen, an amalgamator mounted upon and extending beyond the lines of the frame, rotating mercury-covered paddle-wheels within the amalgamator, means to convey material from the tank to the amalgamator, and means to discharge the refuse from the extended end of the amalgamator.

6. A separator comprising a frame, a laterally-movable excavator therein, a tank upon the frame, having an inclined bottom, a cylindrical screen extending into the tank, a chute fixedly secured to the frame for directing material from the excavator to the screen, said chute being extended laterally to receive material from the excavator when it is in any of its positions, an amalgamator-trough extending laterally from the frame, an endless conveyer for removing liquid and solid matter from the tank and depositing it in the trough, and a conveyer adapted to remove screen-tailings from the tank.

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

JOHN GOTTLANDER.

Witnesses:

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