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PATENTED FEB. 27, 1906.

D. DRAPER & G. A. HAY.

AMALGAMATOR.

APPLICATION FILED MAR. 15, 1905.

2 SHEETS—SHEET 1.

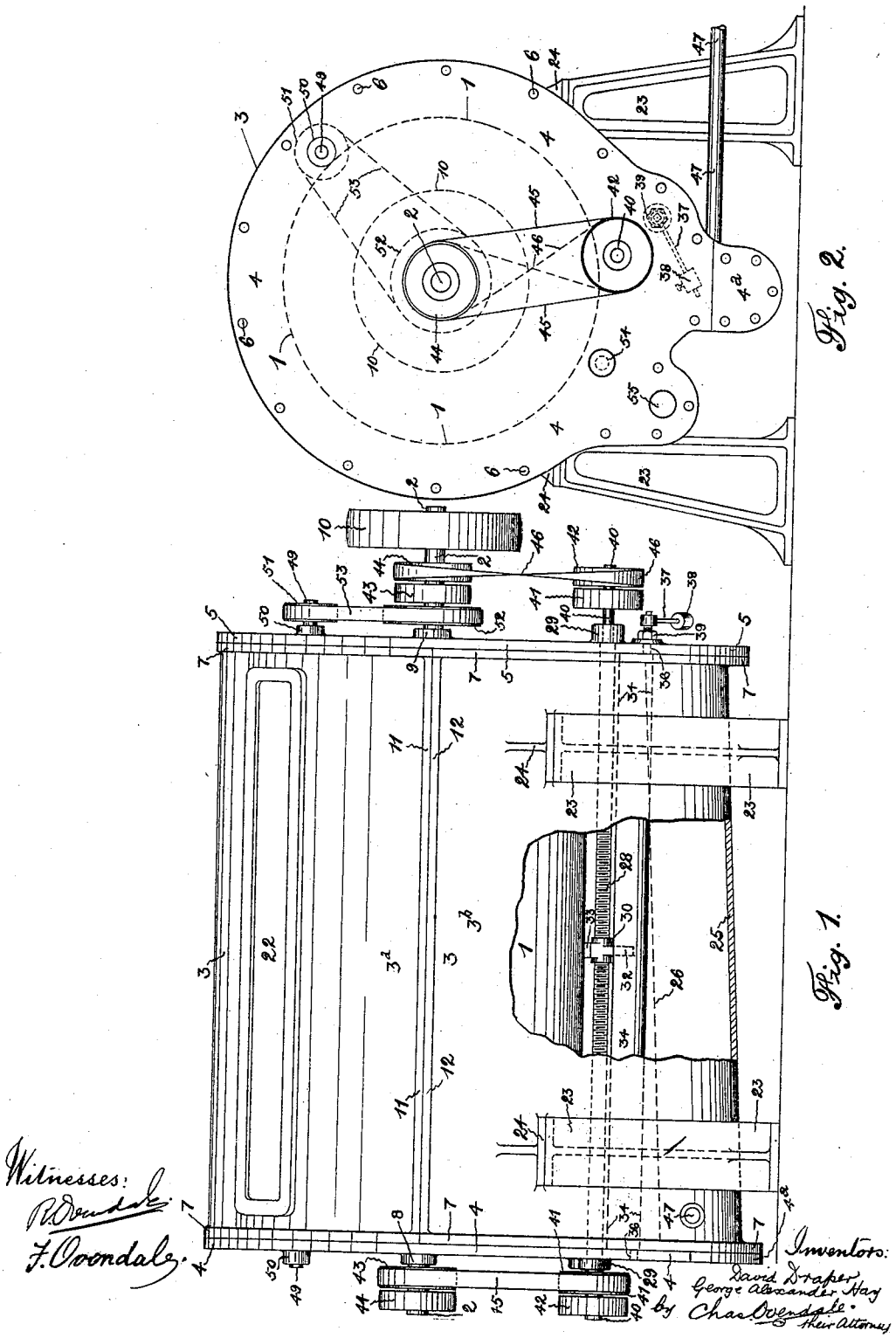


Fig. 2.

Fig. 1.

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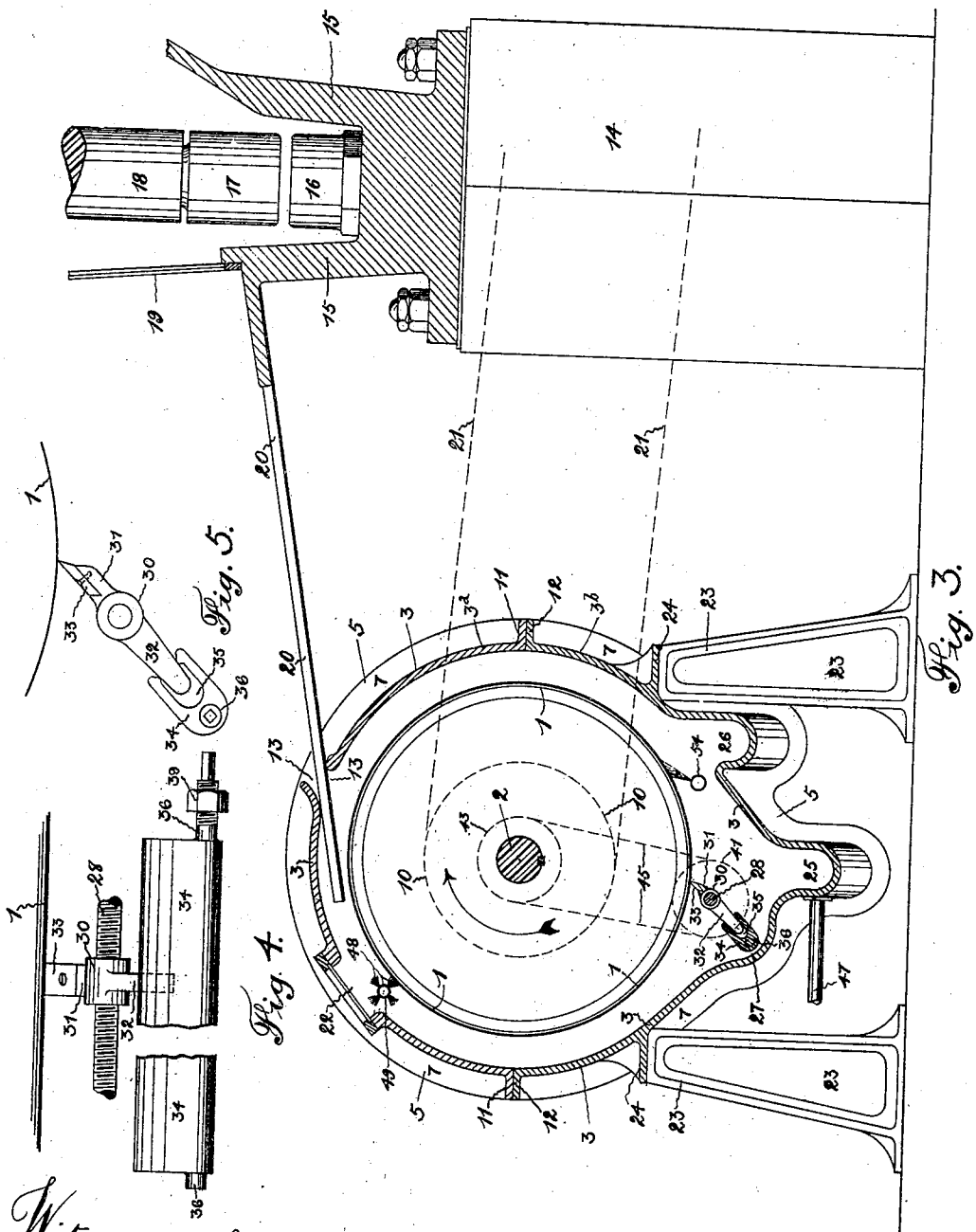


Fig. 3.

Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE.

DAVID DRAPER AND GEORGE ALEXANDER HAY, OF JOHANNESBURG, TRANSVAAL.

AMALGAMATOR.

No. 813,780. Specification of Letters Patent. Patented Feb. 27, 1906.

Application filed March 15, 1905. Serial No. 250,268.

To all whom it may concern:

Be it known that we, DAVID DRAPER and GEORGE ALEXANDER HAY, subjects of the King of Great Britain, residing at Johannesburg, Transvaal, have invented certain new and useful Improvements in Amalgamators, of which the following is a specification.

This invention has reference to an amalgamating machine or apparatus for catching and retaining gold in the process of extracting it from its ore. The machine may be simultaneously employed as a concentrator or for separating the concentrates or heavier particles of the pulverized ore.

The object with which the invention is designed is to produce a machine in which the amalgamation can be carried on continuously or practically continuously. The mill-pulp (the particles of pulverized ore mixed with water) or other material carrying or containing the gold may be caused to flow continuously into the apparatus direct—say from the mortar-box of a stamp-mill.

By means of our invention we obviate the necessity for putting the battery out of operation while the cleaning of the amalgamated plates is effected, and we provide for automatic cleaning and scraping of the amalgamated surface, and we obtain greater security against theft of the gold or amalgam.

The invention will now be described by aid of the accompanying drawings, wherein—

Figure 1 represents an elevation of the apparatus, partly in section. Fig. 2 represents it in end elevation. Fig. 3 represents the general arrangement showing the apparatus in sectional elevation, and Figs. 4 and 5 are two views illustrating the means for removing the amalgam.

The machine consists of a drum or cylinder 1, closed at the ends and made of suitable metal to receive a coating of mercury to provide the amalgamated surface. This drum 1 is shown keyed to a horizontally-disposed driving-shaft 2. The drum 1 is inclosed by a casing 3, closed at the ends by means of the plates 4 5, which may be bolted or otherwise fixed through the holes 6 to external flanges 7, formed on the ends of the casing 3.

The horizontal shaft 2, on which is fixed the drum 1, is journaled in the end plates or covers 4 5 of the casing 3, the latter being constructed with bosses 8 9 to provide a sufficient bearing-surface for said shaft 2.

On one extremity of the driving-shaft 2, outside the casing 3, is fixed a driving-pulley 10, by means of which rotary motion may be imparted to the drum 1 through the medium of a belt. Any other suitable means for imparting rotatory motion to the drum 1 may be employed.

The casing 3 is preferably constructed in two parts, an upper portion 3^a of approximately semicylindrical shape, which is formed with longitudinal ribs or projections 11 for bolting or otherwise fixing it to coincident flanges or projections 12, formed on the lower portion 3^b.

A longitudinal slot 13 is formed in the top of the upper portion 3^a of the casing 3, which forms the inlet for the pulp or material containing the gold.

In Fig. 3 of the drawings the machine is shown arranged for use in connection with an ordinary gravity stamp-mill in which 14 represents the foundation of the mill; 15, the mortar-box bolted thereon; 16, the die; 17, the shoe; 18, the head of the stamp, and 19 the screening through which the particles of pulverized ore are washed or carried by the water. 20 represents an inclined plate or tray which serves for conducting the pulp after it has passed through the screening 19 into the inlet 13 of the amalgamating-machine. The upper edge of the slot 13 is preferably turned outward and upward, as shown in Fig. 3, so as to divert into the machine the pulp flowing down the inclined plate 20. The inclined plate 20 is preferably arranged to project for some distance over the top of the drum 1. The arrow in Fig. 3 indicates the direction of rotation of the drum 1, from which it will be noticed that the flow of the incoming stream as it leaves the edge of the plate 20 is opposite to the direction of rotation of the drum 1. In Fig. 3 the dotted line 21 represents a belt for imparting motion to the drum 1 through the pulley 10.

In the upper portion 3^a of the casing 3 and at the front of the machine is formed a longitudinal slot 22, in which is secured a piece or sheet of glass through which the amalgamated surface of the drum 1 may be inspected.

The machine is carried at a suitable height by means of the standards or supports 23. The lower portion 3^b of the casing 3 is shown constructed with projections 24, which rest

on the top of the standards 23 to support the machine.

The lower portion of the casing 3 is constructed to form two longitudinal and inclined recesses 25 26. It is also shown constructed with a shallower recess 27, in which is located part of the device which serves for removing the amalgam from the surface of the drum 1. This device consists of a screw 28, arranged parallel with the periphery of the drum 1 and journaled in bearings 29, provided therefor in the ends 4 5 of the casing 3. On this screw 28 is mounted a scraper comprising an internally-screwed sleeve or nut 30, formed with two arms or projections 31 32. To one of these arms 31 is detachably fixed the blade 33, which is adapted to be brought into engagement with the periphery of the drum 1 or amalgamated surface to scrape off or remove the amalgam when desired. Arranged parallel with the screw 28 and supported in the ends 4 5 of the casing 3 is a bar 34, which is constructed with a longitudinal groove or recess 35, into which groove or recess 35 projects the other arm 32 of the nut 30. The bar 34 is constructed at the ends with pivots 36 (see Fig. 4) about which it can be moved. On an extension of the pivot 36 at one end of the machine is fixed a lever 37, fitted with an adjustable weight 38. This weighted lever 37 serves for maintaining the scraper 33 either in or out of contact with the amalgamated surface of the drum 1. In Figs. 1 and 2 these parts are shown in the positions they assume to maintain the scraper 33 in contact with the surface of the drum 1. By throwing said weighted lever 37 over it will be readily understood that the bar 34 by engaging the arm 32 of the nut 30 throws and maintains the blade or scraper 33 out of contact with the drum 1. A lock-nut 39 may be screwed on the pivot 36 for fixing the bar 34 and for holding it in the position it is caused to assume to throw the scraper 33 out of action. It will be obvious that the weighted lever 37 will itself have a tendency to accomplish this; but, if desired, the lock-nut 39 may be used as an additional security and to prevent the scraper 33 being unintentionally thrown into contact with the drum 1.

To rotate the screw 28 to traverse the scraper 33 longitudinally of the drum 1, it is constructed with extensions 40, which project beyond the bearings 29, and on each of these extensions 40 are fixed fast and loose pulleys 41 42, respectively. Motion is transmitted to the screw 28 from the main shaft 2, on each end of which are fixed fast and loose pulleys 43 44, respectively, in line with the fast and loose pulleys 41 42 on the extensions 40 of the screw 28. Belts 45 46, arranged round the pulleys, serve for transmitting motion from the pulleys on the driving-shaft 2 to the pulleys on the screw 28. One of these belts is crossed, so as to obtain reversal of the direction of rotation of said screw 28. When motion is transmitted through one of the belts 45 46, the other is meanwhile running on the loose pulleys. When the scraper 33 has reached the limit of its travel in one direction, the belt which has been running on the loose pulleys is then thrown onto the fast pulleys and the belt at the other end thrown onto the loose pulleys, the return travel of the scraper being thereby effected. The belt 45 is shown driving the screw 28 through the fast pulleys 41 43, and the crossed belt 46 is shown running on the loose pulleys 42 44. When the scraper 33 is out of use, both belts 45 46 are running on the loose pulleys 42 44. The scraper 33 is located in such a position inside the casing 3 that the amalgam removed from the surface of the drum 1 falls into the recess or sump 25, from which it may be removed when desired. As shown in Fig. 2, the portion 4^a of the end plate 4 inclosing said recess 25 may be made as a separate part to allow for the removal of the amalgam without necessitating the removal of the whole of the end plate 4. The portion 4^a of the plate 4 forming the door or cover for the delivery end of the amalgam-sump 25 may be locked in any desired manner to prevent unauthorized persons gaining access to the amalgam.

In the lower end of the casing and at a suitable height above the delivery end of the amalgam-sump 25 is fixed a discharge or waste pipe 47, which serves for carrying away the pulp or material from the interior of the casing 3.

In the upper portion of the casing 3 is arranged a brush 48, provided for cleaning the amalgamated surface of the drum 1. This brush 48 may be made of any suitable material and be carried by a shaft or spindle 49, which is journaled in bearings formed in bosses 50 in the ends 4 5 of the casing 3. This brush 48 extends the full length of the drum 1. On one extremity of the spindle 49, outside the casing 3, is fixed a pulley 51, and on the main driving-shaft 2 in line with said pulley 51 is another pulley 52, from which the brush 48 is driven by means of the belt 53. This brush 48, as is indicated in Fig. 3, is preferably arranged in such a position that it can be seen through the glass plate 22. Constructed as shown, this brush 48 will be continuously rotated; but it will be evident that means may be provided for obtaining intermittent rotation only or for throwing it out of action if and when required.

Inside the casing 3, and preferably at or in proximity to the bottom of the drum 1, is arranged a water-spray pipe 54, by means of which the concentrates or heavier particles of the pulverized ore adhering to the amalgamated surface of the drum 1 are washed off. This spray-pipe 54 is so located in relation to the recess or trough 26 that the concentrates

or particles thereby washed off fall into said trough or recess 26. The concentrates may be drawn off from the lower end of said recess 26 through an aperture or pipe 55. (See Fig. 2.)

As previously explained, the pulp flows into the machine down the inclined plane 20 onto the amalgamated surface of the drum 1 in the opposite direction to the rotation of the latter. The gold is thereby caught and retained on the amalgamated surface, and the pulp then passes out through the discharge or outlet pipe 47. The concentrates or heavier particles which are also retained on the amalgamated surface of the drum 1 are washed off when the drum 1 passes above the water-spray pipe 54, and they fall into the concentrate-sump 26, from which they may be drawn. When the brush 48 for cleaning the amalgamated surface is made to operate intermittently, it is brought into action, when required, without stopping the machine. This can be determined by inspecting the amalgamated surface through the glass plate 22. When it is desired to scrape the amalgam off the surface of the drum 1, the scraper 33 is brought into contact with the amalgamated surface and motion imparted to the screw 28 to cause the scraper 33 to traverse from end to end of the amalgamated surface. If requisite, the scraper 33 is then caused to travel across the amalgamated surface in the opposite direction or to the other end of the drum 1 to complete the removal of the amalgam. The amalgam so removed from the surface of the drum 1 falls into the amalgam-sump 25, from which it may be removed when desired. The mercury removed from the surface of the drum 1 may be replenished by running it down the inclined plate 20 or otherwise, as may be preferred.

What we claim as our invention, and desire to protect by Letters Patent, is—

1. An amalgamating-machine comprising a revoluble drum the periphery of which is made the amalgamated surface, a casing surrounding said drum, means for rotating the drum, means for introducing the pulp or gold-bearing material into the casing and delivering it onto the amalgamated surface of the drum, a scraper located in the casing and adapted to be brought into contact with the amalgamated surface to remove the amalgam, and means for traversing said scraper longitudinally of the drum.

2. An amalgamating-machine comprising a drum, the periphery of which is made the amalgamated surface, a casing completely inclosing said drum, means for rotating the drum, means for conducting the pulp into the casing and delivering it onto the amalgamated surface in a direction opposite to that of rotation of the drum, a scraper arranged in the casing and adapted to be brought into contact with the amalgamated surface to remove the amalgam, and means for traversing said scraper longitudinally of the drum.

3. An amalgamating-machine comprising a drum the periphery of which forms or is made the amalgamated surface, a casing inclosing said drum said casing being formed with a longitudinal slot forming an inlet and with a recess or sump to receive the amalgam when it is removed from the surface of the drum, an inclined plate or tray for conducting the pulp into the casing and delivering it onto the surface of the drum in a direction opposite to that of rotation of said drum, a scraper located in the casing above the recess formed in the latter, said scraper being adapted to be brought into contact with the amalgamated surface to remove the amalgam, and means for traversing said scraper longitudinally of the drum in either direction.

4. An amalgamating-machine comprising a drum the periphery of which is made the amalgamated surface, a casing completely inclosing said drum, said casing being constructed with a longitudinal inlet or slot above the drum, and with a recess or sump in the bottom to receive the concentrates removed from the surface of the drum, and with another sump or recess to receive the amalgam when it is removed from the surface of the drum, a revoluble brush arranged longitudinally of the casing for cleaning the amalgamated surface of the drum, means for rotating said brush, a scraper journaled longitudinally of the drum and adapted to be brought into contact with the amalgamated surface, means for traversing said scraper longitudinally of the drum in either direction, and a water-spray pipe located beneath the drum for washing the concentrates off the amalgamated surface of the drum.

5. An amalgamating-machine comprising a drum, the periphery of which is made the amalgamated surface, a casing inclosing the drum said casing being constructed with a longitudinal slot forming an inlet above the drum, and with a longitudinal slot through which the amalgamated surface of the drum may be inspected, and with a recess or sump in the bottom of the casing adapted to receive the amalgam when it is removed from the surface of the drum and with a recess or sump adapted to receive the concentrates, means for removing the amalgam from the surface of the drum said means being adapted to be traversed longitudinally of the drum, means for removing the concentrates from the surface of the drum, means for conducting the material carrying the gold through the inlet in the casing and delivering it in a direction opposite to that of rotation of the drum, and an outlet in proximity to the bottom of the casing for carrying away the waste from said casing.

6. An amalgamating-machine comprising a drum the periphery of which is made the

amalgamated surface, a casing surrounding said drum said casing being constructed with a longitudinal slot forming the inlet for the material containing the gold and with a longitudinal slot through which the amalgamated surface may be inspected and with two inclined recesses or sumps for receiving, the one the amalgam and the other the concentrates, means for conducting the gold-containing material through the inlet and delivering it onto the drum in a direction opposite to that of rotation of the latter, a brush for cleaning the amalgamated surface, means for rotating said brush, a scraper located in the casing for removing the amalgam from the surface of the drum and means for traversing said scraper longitudinally of the drum in either direction, means for removing the concentrates from the surface of the drum and means for conducting the waste from the casing.

7. In an amalgamating-machine, in combination, a drum the periphery of which is made the amalgamated surface, a casing inclosing said drum said casing being constructed with an inlet and with an inclined sump or recess, means for rotating said drum inside said casing, means for conducting the gold-bearing material into the casing in a direction opposite to that of rotation of the drum, a screw journaled in the ends of the casing and arranged parallel with the axis of the drum, a nut mounted on said screw, a scraper carried by said nut adapted to be brought into contact with the amalgamated surface to remove the amalgam, and means for reversing the direction of rotation of said screw to traverse the scraper longitudinally of the drum in either direction.

8. In an amalgamating-machine the combination of a drum, means for rotating said drum, a casing inclosing said drum, said casing being constructed with a longitudinal slot forming an inlet above the drum, and with an inclined recess or sump below the drum, an inclined plate or tray projected through the slot for conducting the gold-containing material into the casing and delivering it in a direction opposite to that of rotation of the drum, a screw journaled in the ends of the casing and arranged parallel with the axis of the drum, means for imparting rotary motion to said screw in either direction, a nut mounted on said screw, a scraper carried by said nut adapted to be brought into contact with the amalgamated surface, an arm or projection on said nut, a bar arranged parallel with the screw formed with a slot into which said arm projects, and means for operating said bar to throw the scraper into or out of contact with said amalgamated surface, substantially as described.

9. In an amalgamating-machine the combination of a drum fixed to a driving-shaft, a casing surrounding said drum the ends of which casing provide bearings for the driving-shaft of the drum said casing being constructed with a slot parallel with the axis of the drum and with a longitudinal slot for permitting inspection of the amalgamated surface and with two inclined sumps or recesses in the bottom, an inclined plate or tray for conducting the gold-bearing material through the inlet and delivering it onto the drum in a direction opposite to that of rotation of the latter, a brush arranged parallel with the amalgamated surface for cleaning said surface, means for driving said brush from the main driving-shaft, a screw journaled in the ends of the casing and arranged parallel with the axis of the drum, a nut on said screw formed with two arms or projections, a scraper fitted to one of said arms or projections adapted to be brought into contact with the amalgamated surface of the drum, a bar pivoted in the ends of the casing and arranged parallel with the screw and formed with a longitudinal groove into which the other arm of the nut projects, means attached to said bar outside the casing for throwing the scraper into or out of contact with the amalgamated surface and retaining it in those positions, a pipe communicating with the casing at the bottom for carrying away the waste, and a water-spray pipe for washing the concentrates off the amalgamated surface into the concentrate-sump, substantially as described.

10. An amalgamating-machine comprising in combination, a drum the periphery of which is made the amalgamated surface, a shaft to which said drum is fixed, a pulley on said driving-shaft for imparting rotary motion to the drum, a casing constructed in two parts longitudinally and formed with longitudinal ribs or flanges through which they are connected, said casing being formed with a longitudinal slot forming an inlet and with a longitudinal slot closed by means of glass for permitting inspection of the amalgamated surface and with two inclined recesses or sumps at the bottom, the ends of said casing forming bearings for the driving-shaft of the drum, standards for carrying said casing, an inclined plate for conducting the gold-bearing material through the inlet in the casing and delivering it onto the drum in a direction opposite to that of rotation of the latter, a brush journaled in the ends of the casing in contact with the amalgamated surface for cleaning the latter, a pulley fixed on the spindle of the brush outside the casing, a pulley on the main shaft and a belt for transmitting motion through said pulleys from the main shaft to the brush, a screw journaled in the ends of the casing parallel with the axis of the drum, fast and loose pulleys on each end of said screw outside the casing, a nut mounted on the screw formed with two arms or projections, a scraper fixed to one of said arms adapted to be brought into contact

with the amalgamated surface of the drum, a bar pivoted in the ends of the casing formed with a longitudinal groove or recess into which the other arm of the nut projects, a lever and weight on the end of said bar outside the casing for rotating said bar in either direction to move the scraper into or out of contact with the amalgamated surface of the drum, fast and loose pulleys on the main driving-shaft at either end of the casing in line with the fast and loose pulleys on the end of the screw, a straight belt and a crossed belt on said pulleys adapted to rotate said screw in either direction from the main driving-shaft or to allow said screw to remain stationary, a water-spray pipe located below the drum for washing the concentrates into the concentrate-sump, and a pipe for carrying away the waste from the casing, substantially as described.

In witness whereof we have hereunto set our hands in the presence of two subscribing witnesses.

DAVID DRAPER.
GEORGE ALEXANDER HAY.

Witnesses:
CHAS. OVENDALE,
R. OVENDALE.