L. SACHSE.

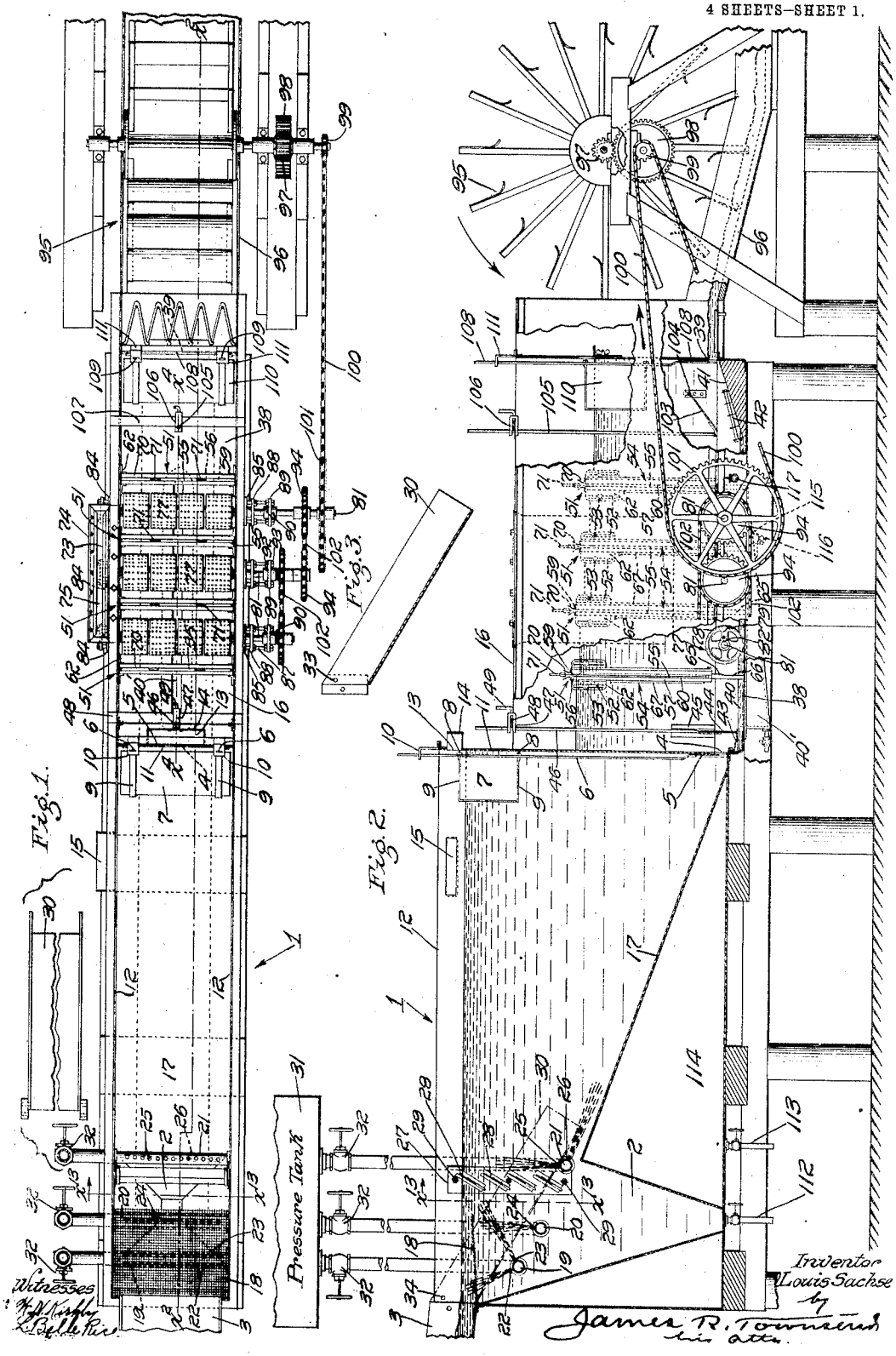
GOLD AND QUICKSILVER SAVING APPARATUS.

APPLICATION FILED AUG. 23, 1911.

1,022,110.

Patented Apr. 2, 1912.

4 SHEETS—SHEET 1.



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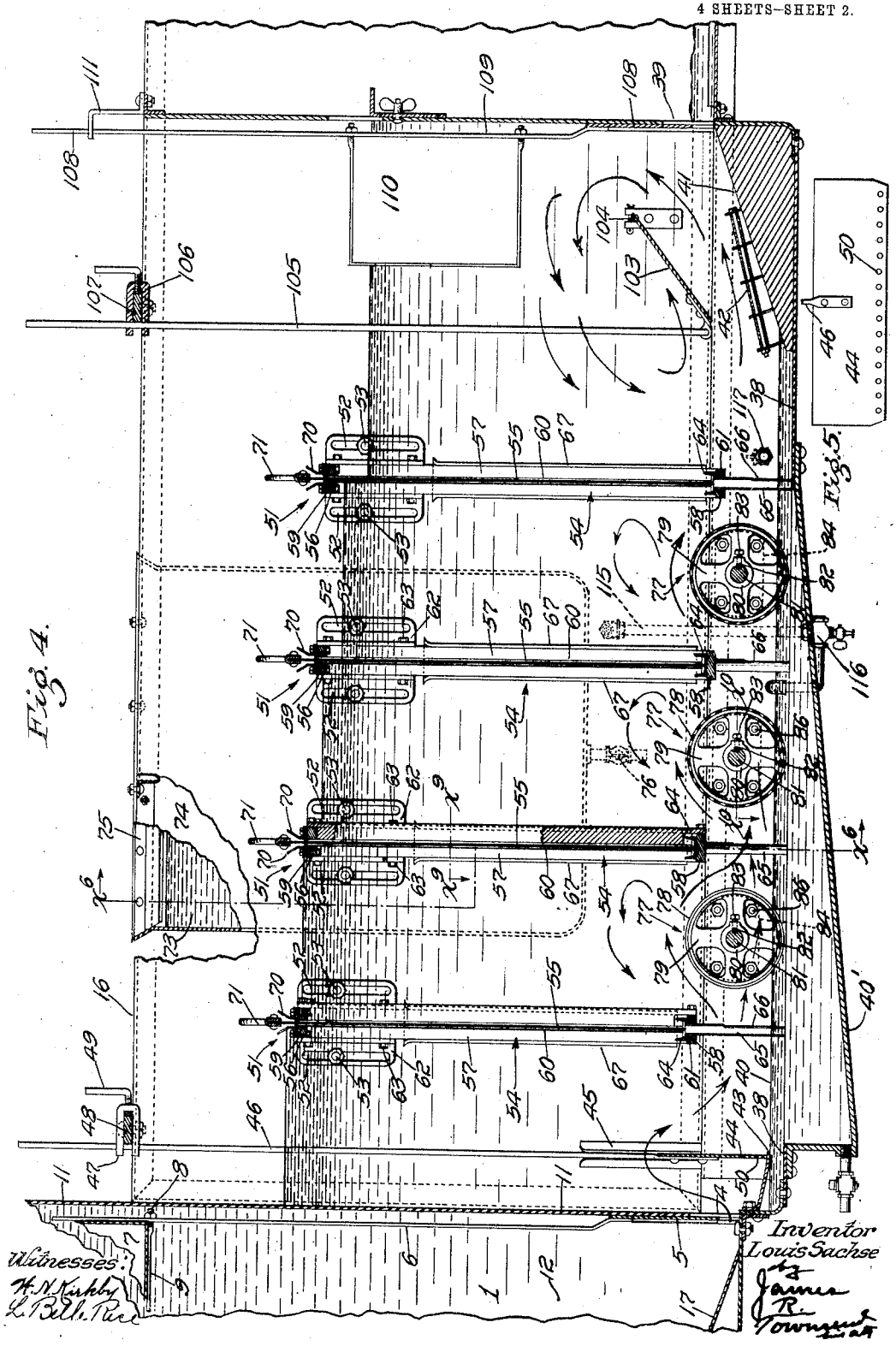

Fig. 4.

Fig. 5.

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4 SHEETS—SHEET 3.

Fig. 6.

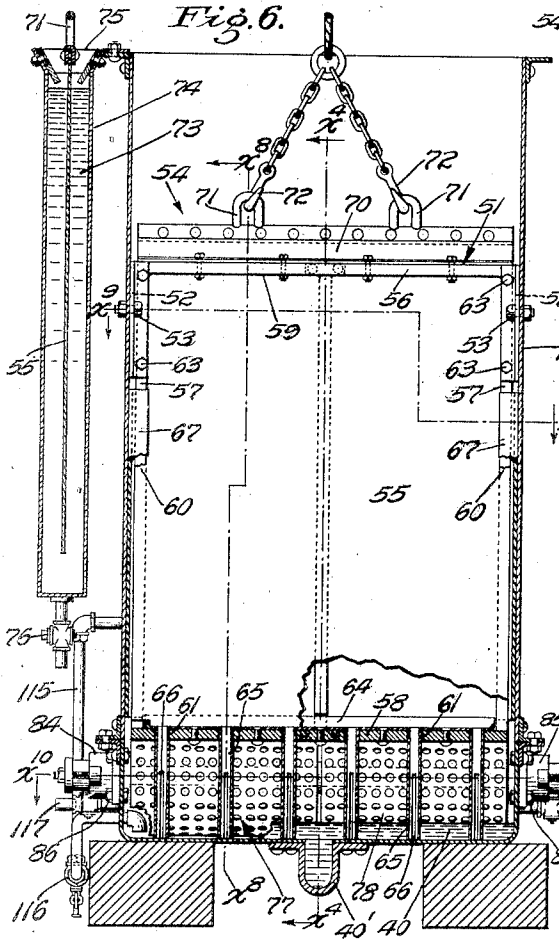


Fig. 7.

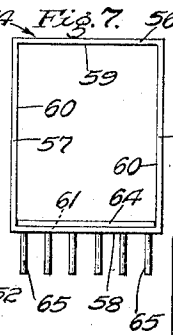


Fig. 8.

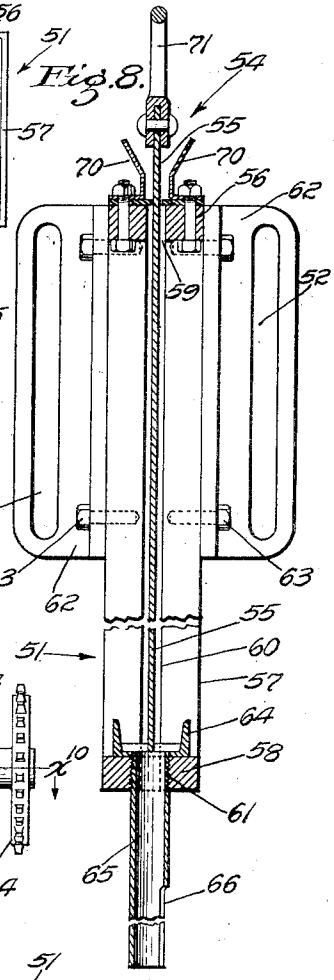


Fig. 9.

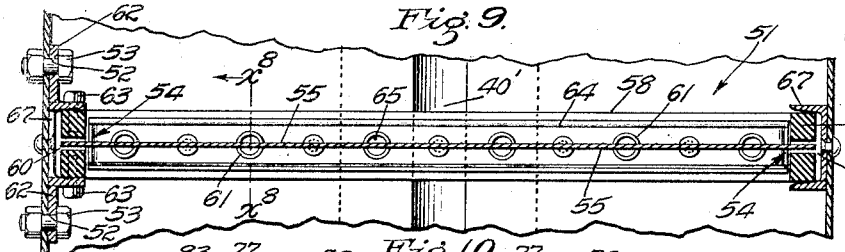
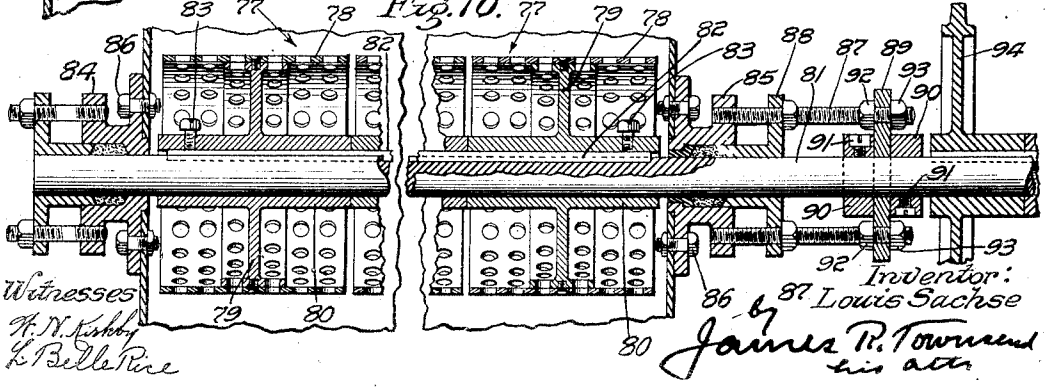


Fig. 10.



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4 SHEETS—SHEET 4.

Fig. 11.

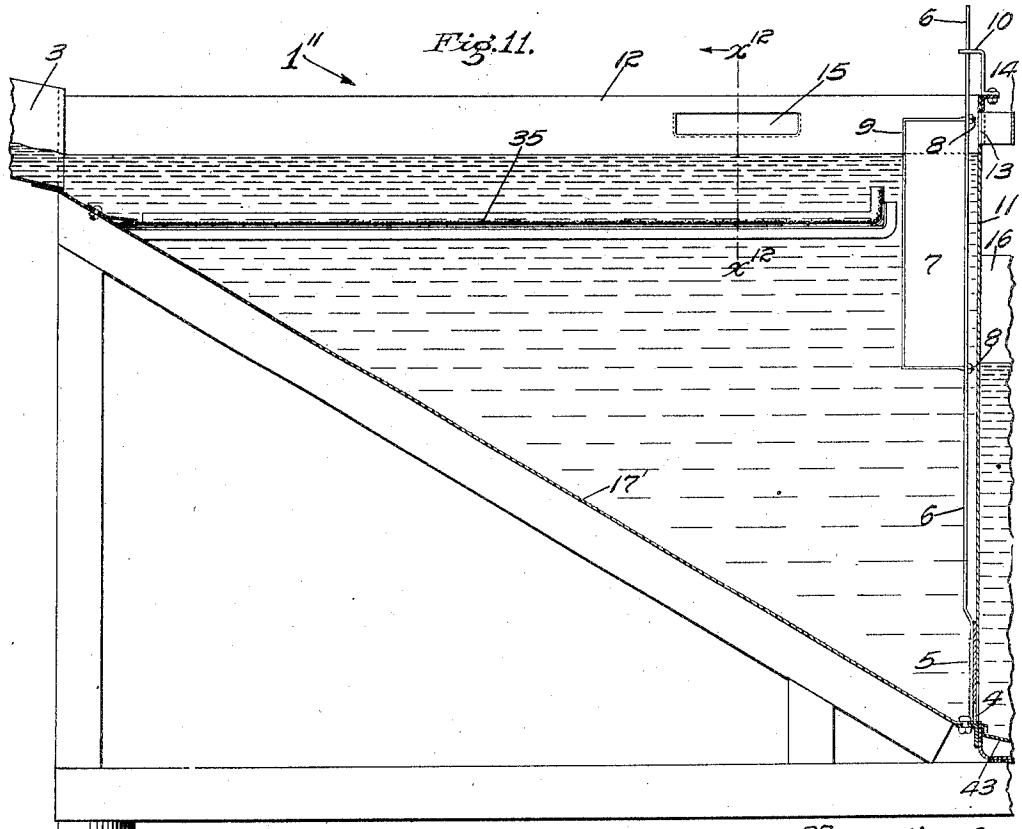


Fig. 12.

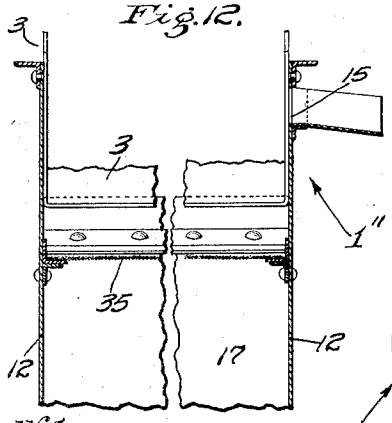


Fig. 13.

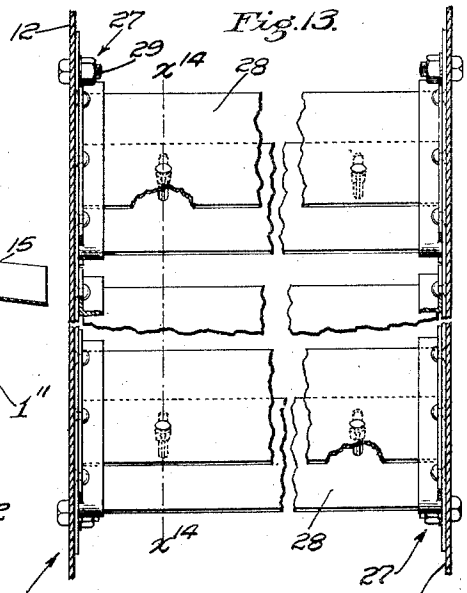
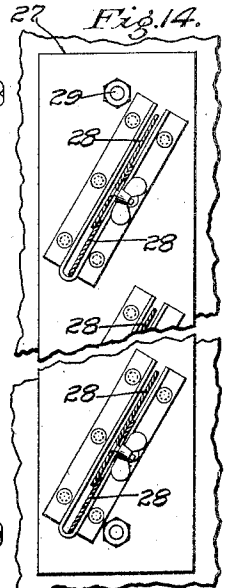


Fig. 14.



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UNITED STATES PATENT OFFICE.

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GOLD AND QUICKSILVER SAVING APPARATUS.

1,022,110. Specification of Letters Patent. Patented Apr. 2, 1912.

Application filed August 23, 1911. Serial No. 645,686.

To all whom it may concern:

Be it known that I, LOUIS SACHSE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Gold and Quicksilver Saving Apparatus, of which the following is a specification.

This invention is an improvement on the gold saving apparatus described in my Patent No. 774,786, patented November 15, 1904.

The object of this invention is to provide a simpler and more compact machine that will collect gold and quicksilver from silt or from other fine material.

The invention may be applied in different sizes and different proportions, and parts thereof may be differently arranged without departing from the spirit of the invention.

An object of the invention is to provide a compact apparatus of minimum size and depth, for carrying into forcible contact with amalgamating surfaces, material to be amalgamated; and to do this in such manner as to avoid wearing the amalgamating surfaces and carrying off the quicksilver therefrom; and also to make provision for recovering the heavy values such as platinum sands which may not be amalgamated by any process at present known that will not also amalgamate the iron sands.

The accompanying drawings illustrate the invention.

Figure 1 is a plan view of apparatus constructed in accordance with the invention and adapted for use as a concentrator to save black sands and gold, and further adapted to be changed so as to save gold and quicksilver without saving black sands. The sluice-box extension is shown removed and set aside, and broken to contract the view. Fig. 2 is a side elevation of the same apparatus partly in section along line x^2, Fig. 1. Dotted lines indicate the sluice-box extension arranged over the black sands pit to especially adapt the apparatus for saving quicksilver when black sands are not to be saved. Fig. 3 is a longitudinal vertical section of the sluice-box extension. Fig. 4 is a broken longitudinal vertical mid-section of the amalgamating tank on enlarged scale and viewed from line x^4, Figs. 1 and 6. The frames for the amalgamating plates are sectioned on different planes. Fig. 5 is an elevation on a reduced scale of the current breaking gate with a fragment of the rod that operates the same. Fig. 6 is a transverse sectional elevation on irregular line x^6—x^6, Fig. 4. Parts are broken away to expose parts otherwise hidden. Fig. 7 is an elevation of one of the frames for the amalgamating plates. Fig. 8 is an enlarged fragmental sectional elevation of one of the amalgamating frames with an amalgamating plate therein. Irregular line x^8, Figs. 6 and 9 indicates the plane from which the view is taken. Fig. 9 is an enlarged fragmental plan in section on line x^9, Figs. 4 and 6. Fig. 10 is an enlarged fragmental sectional plan on line x^{10}, Figs 4 and 6, of one of the amalgamating rollers and parts connected therewith. Fig. 11 is a fragmental longitudinal mid-section of another form of supply tank that may be used for treating material from which the black sands are not to be separated and where the quicksilver predominates. Fig. 12 is a fragmental broken cross section on line x^{12}, Fig. 11. Fig. 13 is an enlarged fragmental broken cross section on line x^{13}, Fig. 2, showing the method of mounting the baffle-plates. Fig. 14 is a fragmental cross section on line x^{14}, Fig. 13.

Arrows on the several section lines indicate the direction of sight.

The supply tank 1 may or may not have the concentrating pit 2 to gather black sands from the flowing material delivered into the tank 1 from the sluice 3. The tank 1 is provided at its bottom opposite the sluice 3 with a supply port 4, the size of the orifice thereof being regulated by the float-controlled gate 5, having operating rods 6 to which is adjustably fixed the float 7 by any suitable means. In the drawings the rods consist of two straps having holes at intervals for bolts 8 fastened to bands 9 that extend around the float 7. The rods 6 extend up through guides 10 fixed to the tank. The discharge end wall 11 of the tank is provided below the level of the side walls 12, with an overflow port 13 and with a rearwardly extending guard 14 projecting from the tank behind the port 13, so that the overflow, if any, from the tank 1 will be caught and directed downwardly behind the end wall. The rods 6 are bent away from the end wall 11 so that there is plenty of space

between such wall and the float for the liquid to flow around the float to overflow through the port 13. By this means the apparatus is made sensitive to sudden changes in the flow of the supply and the delivery through the port 4 is practically maintained uniform in quantity without the necessity of any considerable waste from the supply tank. A lateral overflow port 15 is provided above the level of the end wall to permit any sudden rise of the water to flow off without passing through the amalgamating tank 16 which is located down the stream from the supply tank 1 and receives the discharge from said supply tank through the supply port 4 and also through the main overflow port 13 in case the level of the liquid in the supply tank rises sufficiently above the normal to overflow.

In the apparatus for working silt or tailings containing valuable black sands which it is desired to save, the black sands concentrating pit 2 is provided at the upper end of the supply tank, the floor 17 of which slopes downwardly from the lower side of said pit 2; and a removable screen 18 is arranged extending from the sluice 3 part way over the pit 2; and valved jet pipes 19, 20 and 21 are arranged extending across the supply tank 1 above the pit 2 to discharge jets in the appropriate direction across or through the current flowing from the sluice. The jet pipes are arranged at successively lower levels rearwardly from the sluice 3, and the upper jet pipe 19 has a series of jet holes 22 directed upwardly aslant toward the sluice and other jet holes 23 directed upwardly and rearwardly away from the sluice so as to produce an upward current; thus to support any float gold and gray sands in the current, and to allow the black sands to settle downward. The intermediate pipe 20 is provided with jet holes 24 directed upwardly to buoy the float gold and gray sands; and the lower jet pipe 21 has vertical jet holes 25 to buoy up the float gold and gray sands at the lower side of the pit and downwardly and rearwardly directed jet holes 26 to drive onward along the floor 17 the material which might otherwise settle onto the floor below the pit. The jet holes 26 are directed toward the outlet 4 to cause a current along the top of the floor 17 and prevent sediment from accumulating on said floor.

A removable current deflector comprising frames 27 and slats 28 corresponding to the slats in my former patent is secured by bolts 29 to the side walls 12 and can be removed therefrom by taking out the bolts which may afterward be returned to close the holes to prevent leakage from the tank.

The removable screen 18 may be a 40-mesh punched screen and serves to support the lighter material and allow the black sands to fall through into the pit. Said screen projects rearwardly from the sluice over about halfway across the top of the pit 2, thus helping to support the lighter material for a considerable distance over said pit.

When it is not desired to save the black sands, the screen 18 and the deflector will be removed and a sluice box extension 30 is applied to the end of the sluices 3, and extends aslant down over the pipes and the pit and rests on the lower pipe 21 and conducts the material directly from the sluice 3 over the pit to the sloping floor 17. The lower end of the sluice box extension 30 is supported somewhat above the floor to allow the jet to play between it and the floor. The jet pipes 19, 20 and 21 are supplied through a pressure tank 31 and are provided with valves 32 by which the jets may be controlled. When the sluice box extension 30 is in place, the valves of pipes 19 and 20 will be closed, but the jet 26 from the pipe 21 will be allowed to play down the floor 17 as before. The jet 25 will be partially closed by the sluice box 30 resting on the pipe 21, and the sluice box extension 30 may be secured by bolts through holes 33, 34 in the sluice box extension and the side wall 12. A fool proof screen 35 may be extended over the greater portion of the tank 1 or 1″ as shown in Fig. 11 to intercept any coarse gravel which may through carelessness or accident be allowed to come down the sluice. When the value of the quicksilver is greater than that of the black sands it may be advisable to pass the black sands on through the apparatus, saving only the quicksilver and float gold.

The amalgamating tank 16 is placed at the tail of the supply tank 1 and its floor 38 is below the level of the supply port 4. Said tanks are connected together water tight and the amalgamating tank 16 is provided at its tail with an outlet 39 at a higher level than the supply port 4. In practice I have placed the floor 38 of the amalgamating tank about three inches below the level of the supply port 4, and the outlet 39 about six and one-half inches above the level of the bottom, so that the amalgamating tank 16 is adapted to hold a charge 40 of quicksilver in the bottom. Preferably a charge of quicksilver one inch deep over all will be supplied to the amalgamating tank; there being an amalgam gutter 40′ along the middle of the bottom of the tank with draw-off cock as in my former patent. The rear end of the floor of the amalgamating tank has an upward slope 41 on which is arranged a grating 42 to intercept possible drifting quicksilver particles.

Now referring to Fig. 4, a lip 43 extends rearwardly from the supply port 4 and above said lip a current breaking gate 44 is ar-

ranged to slide up and down in guides 45, there being an operating rod 46 fixed to the gate and extending through a U-clamp 47 mounted on a bar 48 connected with the top of the amalgamating tank 16. A set screw 49 screws through the U-clamp 47 against the bar 48 to draw said clamp against the rod 46 to hold said rod and its gate in adjusted position. The current breaking gate 44 extends above the level of the outlet 4 so that when said current breaking gate rests upon the lip most of the liquid flowing from the supply port 4 must rise past the gate 44. By elevating the current breaking gate 44 to a greater or less extent, the current may be divided, part of it passing below the gate and part above the gate. The lip 43 is downwardly and rearwardly inclined to the level of the surface of the quicksilver charge 40, so that when the gate is raised the liquid will flow onto the quicksilver at an angle. Said gate 44 is provided with a series of holes 50 arranged just above the lower edge of the current breaking gate, so that when such gate is closed there will be a divided flow of liquid through the holes just above the level of the quicksilver.

A number of adjustable amalgamating plate frames 51 are arranged at intervals along the amalgamating tank, each being provided with vertical slots 52 through which bolts 53 are passed to adjustably fix the frame to the side walls of the amalgamating tank 16. Each of said frames is provided with ways 54 to receive removable amalgamating plates 55 which may be slid into said ways 54 from the top. The amalgamating plate frames 51 may be made of a single piece of bar iron bent to form the top bar 56, side bars 57 and bottom bar 58, the top bar 56 being provided with a vertical slot 59, the side bars with grooves 60 and the bottom bar with holes 61. The ears 62 are fastened by machine bolts 63 to the side bars, said ears 62 being provided with the slots 52 through which the bolts 53 extend.

A channeled iron bar 64 is fixed to the top of the bottom bar 58 of the amalgamating frame and both of said bars are provided with threaded holes into which the quicksilver and amalgam discharge pipes 65 are screwed, thus fixing the trough to the bottom bar 58. The amalgam discharge pipes 65 are provided on the down stream side with outlet slots 66 to prevent choking. Said pipes are arranged about four inches, more or less, apart across the entire width of the amalgamating plate tank. The guide 67 holds the amalgamating frames upright.

The amalgamating plates 55 when inserted into their frames respectively extend from top to bottom of said frame and close the orifice inside the frames, so that the liquid must pass under the frames on the way to tailings discharge 39. The bottoms of said plates are contained inside the troughs 64 and said plates are made of copper coated with quicksilver, so that any quicksilver or gold which may come into contact with the plates will adhere thereto and as the accumulations occur the quicksilver and amalgam may flow down the plates into the troughs and from the troughs down the pipes 65 into the quicksilver charge at the bottom of the amalgamating tank.

The amalgamating plate frames 51 are provided at their tops with diverging guide wings 70 and the amalgamating plates 55 are provided at their tops with eyes 71 into which hooks 72 may be caught for the purpose of lifting the amalgamating plates from their frames and immersing them in a quicksilver bath 73 contained in the quicksilver dipping tank 74 which is fastened to the side of the amalgamating tank 16 and is provided with a flaring mouth 75 to receive the amalgamating plates respectively when it is desired to re-coat the plates with quicksilver. The dipping tank 74 is provided with a drain cock 76 at the bottom by which amalgam and quicksilver may be drawn off from said dipping tank.

Between the amalgamating plate frames are mounted the amalgamating rollers 77 comprising perforated copper cylindrical shells 78 screwed to spiders 79 carried by hubs 80 that are fixed on shafts 81 by feathers 82 that prevent relative rotation of the spiders and shafts, and by set-screws 83 that prevent looseness or endwise displacement. Said shafts 81 are located above the quicksilver level and the copper shells 78 extend down below the top level of the quicksilver charge 40. The shafts 81 extend through the side walls of the tank 16 and are journaled in stuffing boxes 84, 85 that are fastened by bolts 86 to said side walls.

On one side of the amalgamating tank the stud bolts 87 that tighten the gland 88 in the stuffing box pass through a yoke 89 through which the shaft 81 extends, and collars 90 are fixed by set-screws 91 to the shaft 81 on opposite sides of the yoke 89 which is held in place on said stud bolts 87 by nuts 92, 93. Said yoke may be mounted on either side of the tank and a sprocket wheel 94 is fixed on the shaft 81 for the purpose of rotating it and the copper roller.

In the form shown, four amalgamating plates are employed and three amalgamating rollers are arranged between said plates. Said rollers are driven by an under-shot wheel 95 extending down into the tailing sluice 96 and driven by the tailings as they flow from the machine. Said wheel 95 is provided with a pinion 97 driving a spur

wheel 98 which drives a small sprocket wheel 99 that drives a sprocket chain 100, which in turn drives a large sprocket wheel 101 that is fixed to a shaft 81 on one of the rollers and on which shaft is fixed one of the sprocket wheels 94. The sprocket wheels 94 on adjacent roller shafts 81 are connected by sprocket chains 102 so that all the rollers are simultaneously turned as overshot rollers; that is to say, their tops move with the current so that the fresh quicksilver face is turned up from the quicksilver bath at the bottom toward the current, thus to immediately catch the onflowing gold or quicksilver therein.

An adjustable current deflector 103 is pivotally mounted above the upward slope 41 of the floor of the amalgamating tank; the pivot 104 thereof being at the rear side of the deflector and a handle in the form of a rod 105 is pivoted to the front edge of the deflector, is led thence upward and is fastened by a clamp 106 to a cross bar 107.

The outlet 39 from the amalgamating tank is controlled by a float-adjusted gate 108 supported by rods 109 carried by the float 110 and held true by a guide 111.

In practical operation the tailings, silt-carrying water or the like flowing material to be treated will be delivered through the sluice 3 to the supply tank and the supply and amalgamating tanks will become charged therewith, and the liquid will flow out at the outlet 39; the heavier material in the supply tank settles toward the sloping floor 17 and is swept by the undercurrent from the jet 26 down through the supply port 4, the orifice through which is regulated by the float-controlled gate 5, the float 7 for which is adjusted to accommodate the material delivered to the tank through the sluice 3. The heavier material thus reaches the lip 43 and may pass on through the holes 50 in the current breaking gate 44 while the main current of the material to be treated flows over the current breaking gate 44 and under the first amalgamating frame. The onflowing material is driven by its current onto the rotating amalgamating rollers, passing over the same and also through the holes herein, thus coming intimately into contact with the amalgamating surfaces of said rollers which are constantly recoated with quicksilver from the charge 40 in the bottom of the amalgamating tank; and the freshly re-coated surfaces move up from the charge at the front of the rollers and over the top and down at the rear and this action and the action of the material keep the surfaces bright.

The passages beneath the amalgamating plate frames and the plates therein successively decrease in area toward the tail outlet so that the heads of the liquid in the spaces above the amalgamating plate frames successively increase, with correspondingly increased current so that accumulations of sediment at the tail of the apparatus as well as elsewhere will be avoided. The liquid at the tail of the amalgamating tank will circulate over and around the deflector 103, the front end of which may be raised or lowered to decrease or increase the deflecting effect of the deflector.

In practice the material flows quite rapidly through the apparatus and by rotating the amalgamating rollers so that their tops move with the current, the amalgamating surfaces thereof are comparatively at rest relative to the current and the material forced by the current to said surfaces will be caught thereby.

By raising or lowering the float 110 on the gate rod 108 the size of the tailings outlet at 39 may be regulated and consequently the depth of the liquid in the amalgamating tank under a certain supply may be practically determined.

The amalgamating plates serve as deflectors and as means for catching quicksilver and gold which may come into contact therewith from the body of the liquid material in the inter-plate spaces of the tank. The current passing through between the pipes 65 is deflected upwardly by the rollers in said inter-plate spaces and the liquid material in each of said spaces circulates around in the spaces, thus assisting in bringing the values into contact with the amalgamating surface.

From time to time as occasion may require the amalgamating plates are lifted from the frames and dipped in the quicksilver tank 74 and then replaced in their frames, thus keeping the plates well-coated. Any quicksilver which may flow down the plates from the effect of such dipping or which may accumulate from the liquid material passing through the apparatus will run down through the pipes 65 into the charge of quicksilver 40.

In case the black sands are not to be saved a shorter supply tank, as shown in Fig. 11, may be furnished and in that case the sloping floor 17' will be steeper than in the form shown in Figs. 1 and 2 where the black sands pit is provided. A valved pipe 112 is provided to draw off the black sands from the pit 2 and a corresponding valved pipe 113 to draw off any leakage that may find its way into the bottom space 114 of the supply tank under the floor 17.

In the apparatus shown the tanks are about thirty-six inches wide inside the side walls and the supply tank is about five feet deep at the port 4; the amalgamating tank is about six feet six inches long and the supply port and outlet port are about four

inches deep and extend practically all the way across the amalgamating tank and the apparatus is designed to handle from about one hundred and fifty to two hundred miners' inches of material.

A mercury gage provided with a glass 115 outside the amalgamating tank communicates with the inside of the tank at the bottom thereof and also above the mercury level, thus to be filled with mercury to the mercury level and with the liquid material above the mercury level. Said gage is provided with a draw-off cock 116 below the bottom of the amalgamating tank and the inner end of the gage is provided with a down turned elbow so that the margin of the mouth thereof is in a horizontal plane near the floor of the tank and no material except the mercury or fluid amalgam may enter the gage.

Drainage and discharge pipes 117 are provided behind the last amalgamating plate frame and lead through the side walls of the amalgamating tank from just above the mercury level to carry off to a concentrator any heavy non-amalgamating values, as platinum, that may occur in the amalgamating tank.

In order to properly handle the material in the amalgamating tank so as to bring it into forcible contact with the amalgamating surfaces it is necessary that a considerable depth of water be maintained in the amalgamating tank; and in order to supply the heavy material to the amalgamating tank and to keep the silt or other solid materials moving so that the values therein may come into contact with the amalgamating surfaces it is necessary that the material shall be supplied below the surface of the liquid in the amalgamating tank; and that where it is so supplied there should be a considerable pressure in order to keep the material moving. It is also necessary that provision shall be made whereby the heavy material will not be allowed to settle and clog the apparatus at any point. The sloping bottom 17 of the supply tank is entirely essential because where the gray sands and floating gold are carried outside the slats, so that if the bottom was not in this shape, they would pile up and accumulate and flow back in the concentrator well where I gather black sands to draw off at the bottom. The jet-pipes throw the gray sands over, and the black sands settle into the black sands well.

In practical operation the effective buoyancy of the solids contained in the water that move through the apparatus will depend upon the depth of the water where the particular particle that is to be carried forward chances to be. That is to say, the pressure of moving liquid upon a solid therein increases as the submergence increases; and the tendency of the solid to sink and come to rest at the bottom of such liquid decreases in proportion to such submergence. At the outlet end of the supply tank the depth of water is greater than at the inlet end of the said tank and there is also a sensible current caused by the outflow of the liquid at the bottom of the supply tank. At the inlet end immediately at the upper end of the sloping floor the tendency of the solid particles to settle is greater than at the outlet end, owing to the less depth of water, and in order to equalize the tendency of the liquid to buoy up and move forward the solids the spray 26 is applied. When the current-breaking gate 44 is shut down in front of the outlet 4 from the bottom of the supply tank, as shown in Fig. 4, where said gate 44 is at rest upon the lip 43 at the level of the mercury 40, the liquid flowing through the outlet 4 impinges against the gate 44 and is forced to rise; and the upward direction thus given the current will carry the solids to a greater or less height in the liquid contained in the tank depending upon the head of water in the supply tank. As a rule the liquid in the supply tank should be about sixteen inches higher than the liquid level at the head of the amalgamating tank. The current breaking gate 44 rests on the lip 43 and throws the current upward, thereby setting up a pulsating motion in the liquid as it flows.

In practical operation the apparatus is of large capacity being usually capable of handling 200 miners' inches or more and the current therethrough is very forcible at the openings which are controlled by gates. The liquid which passes through the apparatus is of very great specific gravity owing to the very large amount of earthy and mineral matter carried by the water and such specific gravity increases with the depth for the reason that the heavier values and blank sands and heavy gangue settles to the bottom in a greater or less degree with the consequence that the dynamic force of the liquid at the lower depths is greater than at the top. By providing the steep sloping floor 17 in the unobstructed supply tank 1 the main current of the heavy material at the discharge end of the tank flows readily down said floor to the supply port 4 and reaches the amalgamator without liability of clogging in the supply tank. At the inlet end immediately at the upper end of the smooth sloping floor the tendency of the solid particles to settle is greater than at the outlet end and in order to buoy up and move forward the solids at this part of the supply tank the spray 26 is applied and the liquid therefrom assists to increase the velocity of the current down the smooth sloping floor, so that the heavier material

does not settle and clog the supply tank and a practically constant pressure to force the water into the amalgamating tank under a considerable head therein is thus maintained. The float 7 is arranged in the supply tank above the liquid level of the amalgamating tank so as to maintain the appropriate head at the supply port 4.

If by accident the gate 44 should be left raised while sufficient head for practical operation is on in the supply tank, the current issuing from the outlet 4 will be so great as to scour out the quicksilver and amalgam and carry it out of the machine or in case the current is not so strong it will agitate the quicksilver and cause it to flour and float off. In operation the gate 44 is kept shut all the time, the only purpose of making it adjustable is to readily clean out any solids which may have settled therein after the operation of the apparatus is stopped; and then the gate may be drawn up and the machine washed.

The solids that are buoyed upward and carried over the current-breaking gate will reach different portions of the first amalgamating plate depending upon the fineness of the particles; and those particles which do not contact with the first amalgamating plate or with the first amalgamating roller will be carried upward by the upward current caused by the amalgamating roller and may come into contact with the second amalgamating plate and so on through the amalgamating tank, the liquid carrying the solids from plate to roller and from roller to plate, thus catching the values until the last amalgamating plate is passed. The depth of the liquid in the amalgamating tank reduces step by step as the amalgamating plates are passed respectively, thus decreasing step by step the buoyant tendency of the liquid at the surface of the mercury so that the heavier solids are carried more lightly at the head of the amalgamating tank than at the tail thereof and the platinum sands may accumulate after the last amalgamating plate.

In practical operation of machines of this kind it is customary to take out the coarse gold by riffles, not shown, and pass the material through a 20-mesh screen and then to run through the apparatus and any gray sand that may pass through a 20-mesh screen will be buoyed and carried through all the compartments and hollow spaces of the amalgamating rollers with a head of about twenty-five inches above the outflow at the tail of the tank.

The construction of my former apparatus described in Patents Nos. 750,227 and 774,786, was aimed entirely for the amalgamation of the so-called float gold or moss gold, called by the miners on some of our northern rivers, moss gold, because it is deposited on the felt-like moss in the cracks of the rocks on shore during winter floods and summer freshets and is found on the very top of high water mark, being comparatively free from heavy silt. My former apparatus does good work, but yet the concentrating device did not give such clean results as desired. The sloping bottom of the supply tank is wanting and much more so now when working the heavy silts and iron sands from the bottom of rivers. The current breaker is a very essential part of the apparatus. Without it the scouring impact of the sand would flour the quicksilver on roller and plate and destroy their amalgamating functions entirely. This current breaker rests on the lip in the amalgamating tank and throws the flow upward and thereby gives a pulsating and not a scouring motion. Practical experience has proved that without the current breaker, quicksilver is found carried outside the machine. The small holes in the lower part of the gate are provided for the discharge of the quicksilver, carried by the inflowing silt.

By practical test I found that a nugget of platinum weighing sixteen grains would be held partly immersed, but not sink to the bottom of the quicksilver bath. Most of the platinum found will pass a 90-mesh screen and under a head of twenty inches of water is buoyed above the quicksilver. Excessive use of sodium amalgam in my apparatus would amalgamate such platinum, but the action would be the same on the clean iron sands which predominate in placer ground and therefore sodium should be used very sparingly.

The space between the surface of the mercury and the bottom of the amalgamating plates respectively is established by setting the amalgamating plate frames. When once the frame is set the plates may be removed and replaced and when replaced the operation of the apparatus will continue as before.

Platinum generally occurs, in nature, in the form of fine sand which under the buoyancy of twenty inches of water above the surface of the quicksilver will not sink into the quicksilver or become amalgamated thereby and yet will be too heavy to be carried over the slope 41. The platinum may thus accumulate at the tail end of the tank, and from thence will flow off through the pipes 117 left open for that purpose.

I claim:—

1. A gold and quicksilver saving apparatus comprising an unobstructed supply tank having a smooth loping floor; means to deliver the metal-carrying liquid to the supply tank; an amalgamating tank adapted to contain quicksilver, and having an outlet;

said floor sloping from receiving end to outlet to practically increase the submergence of the floor thereof from end to end; there being a supply port between the tanks at the lower end of the sloping supply tank floor above the level of said lower end of the supply tank floor and above the quicksilver level of the amalgamating tank and below the level of the outlet; amalgamating apparatus in the amalgamating tank above and below the supply port level; a gate for the supply port, and a float in the supply tank operatively connected with the gate to maintain an approximately constant level of material in the supply tank.

2. A gold and quicksilver saving apparatus comprising a supply tank having a sloping floor; means to deliver the metal-carrying liquid to the supply tank, an amalgamating tank adapted to contain quicksilver, and having an outlet; there being a supply port between the tanks at the lower end of the sloping supply tank floor above the level of said lower end of the supply tank floor and above the quicksilver level of the amalgamating tank and below the level of the outlet; amalgamating apparatus in the amalgamating tank above and below the supply port level; a gate for the supply port, and a float in the supply tank operatively connected with the gate to maintain an approximately constant level of material in the supply tank, and a current-breaking gate in front of the supply port.

3. A gold and quicksilver saving apparatus comprising a supply tank having a sloping floor; means to deliver the metal-carrying liquid to the supply tank; an amalgamating tank adapted to contain quicksilver, and having an outlet; there being a supply port between the tanks at the lower end of the sloping supply tank floor above the level of said lower end of the supply tank floor and above the quicksilver level of the amalgamating tank and below the level of the outlet; amalgamating apparatus in the amalgamating tank above and below the supply port level; a gate for the supply port; a float in the supply tank operatively connected with the gate to maintain an approximately constant level of material in the supply tank, and a vertically adjustable current-breaking gate in front of the supply port.

4. The combination with a supply tank and an amalgamating tank having a supply port between them; said amalgamating tank being provided with a contracted discharge outlet so as to maintain a depth of liquid in the amalgamating tank, of a gate to control the port and a float in the supply tank above the liquid level of the amalgamating tank and connected with the gate to raise and lower the same.

5. The combination with a supply tank and an amalgamating tank having a supply port between them, of a lip in the amalgamating tank below the port, a current-breaking gate above the lip and means to adjust said gate toward and from the lip.

6. The combination with a supply tank and an amalgamating tank having a supply port between them, of a lip in the amalgamating tank below the port, a current breaking gate above the lip and means to adjust said gate toward and from the lip; said current-breaking gate being provided with holes to allow jets to flow through the gate; and amalgamating surfaces below the gate.

7. In a gold and quicksilver saving apparatus, the combination with an amalgamating tank having a supply port and an outlet, of amalgamating surfaces in the tank, means to force liquid through the port into the tank and a current-breaking gate in the tank between the port and the amalgamating surfaces.

8. In a gold and quicksilver saving apparatus, the combination with an amalgamating tank having a supply port and an outlet, of amalgamating surfaces in the tank, means to force liquid through the port into the tank, and a current-breaking gate in the tank between the port and the amalgamating surfaces; said gate being provided at the lower edge with holes to discharge material toward said surfaces.

9. In a gold and quicksilver saving apparatus, the combination with an amalgamating tank having a supply port and an outlet, of amalgamating surfaces in the tank, means to force liquid through the port into the tank, a current-breaking gate in the tank between the port and the amalgamating surfaces; and means to raise and lower the gate.

10. In a gold and quicksilver saving apparatus, the combination with an amalgamating tank having a supply port and an outlet, of amalgamating surfaces in the tank, means to force liquid through the port into the tank, a current-breaking gate in the tank between the port and the amalgamating surfaces; said gate being provided at the lower edge with holes to discharge material toward said surfaces; and means to raise and lower the gate.

11. In a gold and quicksilver saving apparatus, a supply tank, an amalgamating tank, there being a supply port between said tanks and an outlet port from the amalgamating tank; said amalgamating tank being adapted to hold a charge of mercury; amalgamating plates in the amalgamating tank terminating above the mercury level; amalgamating rollers between the plates and extending below the mercury level, and above the level

of the lower edges of the plates; means controlled by the liquid in the supply tank above the liquid level of the amalgamating tank to control the supply port, and means controlled by the liquid in the amalgamating tank to control the outlet.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 18th day of August, 1911.

LOUIS SACHSE.

In presence of—
JAMES R. TOWNSEND,
L. BELLE RICE.