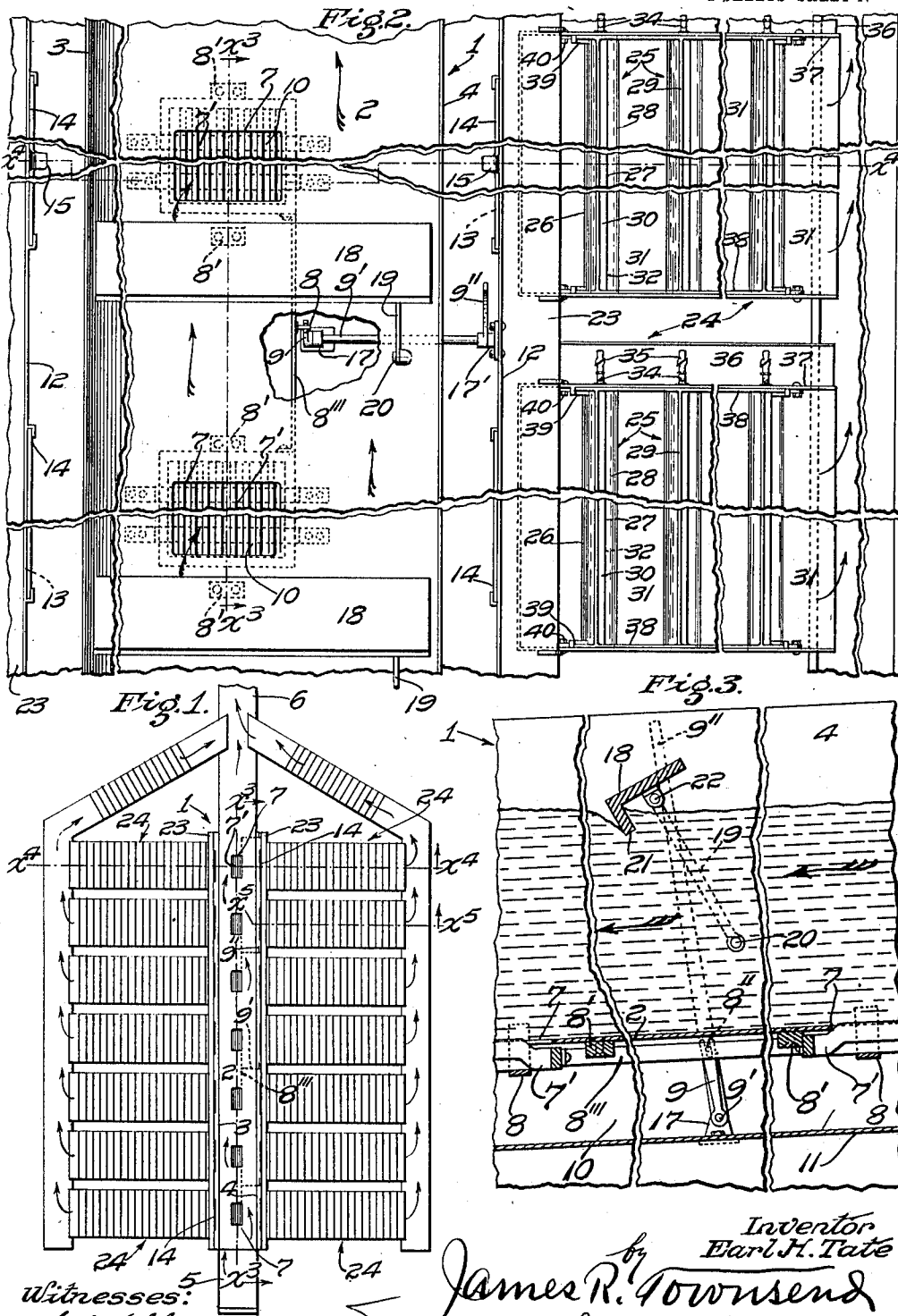


E. H. TATE.
AMALGAMATING FLUME TABLE.
APPLICATION FILED SEPT. 9, 1909.

1,021,277.

Patented Mar. 26, 1912.

2 SHEETS-SHEET 1.



Witnesses:
J. N. Kibbey
L. Belle Rice.

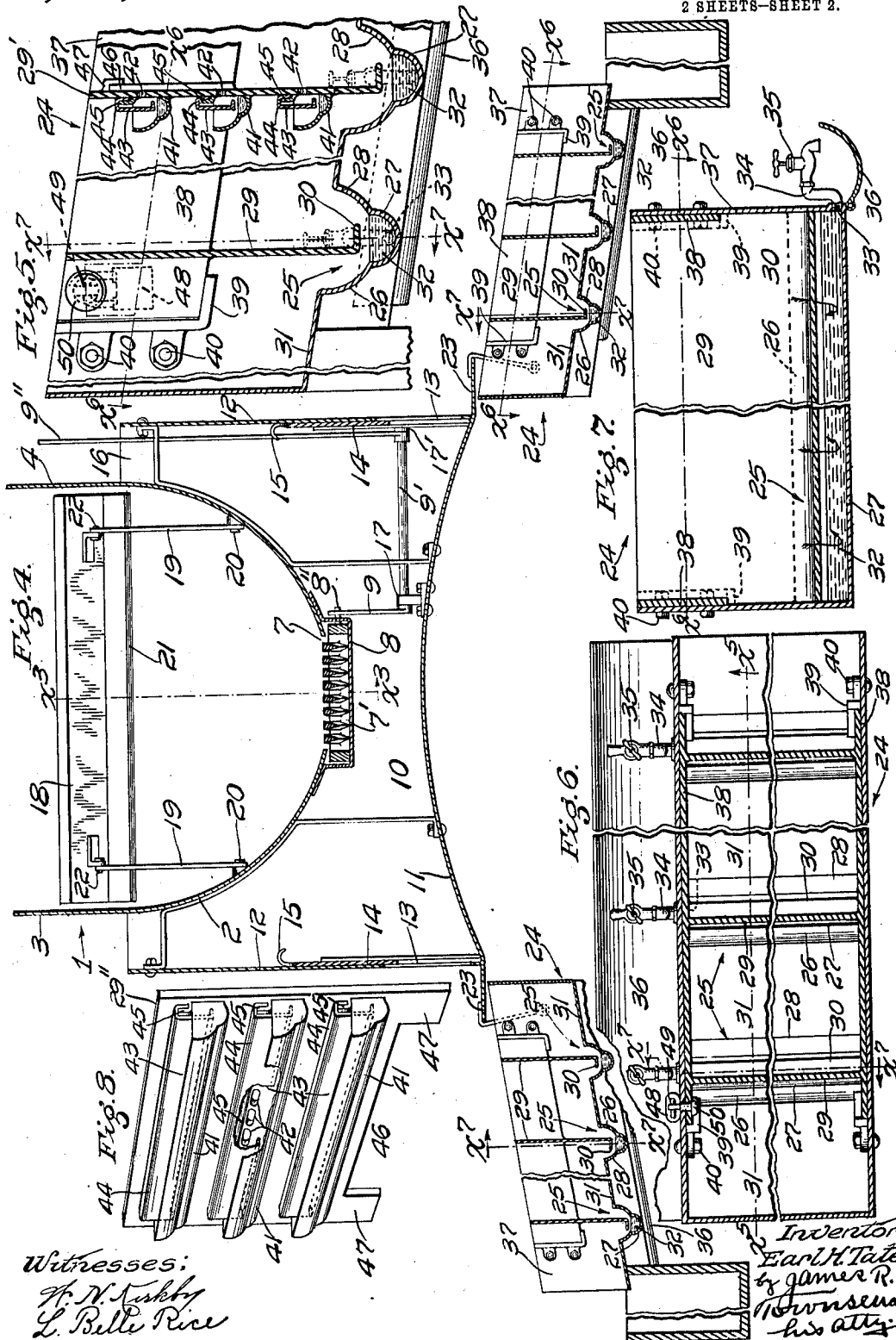
Inventor
Earl H. Tate
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by James R.
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UNITED STATES PATENT OFFICE.

EARL H. TATE, OF LOS ANGELES, CALIFORNIA.

AMALGAMATING-FLUME TABLE.

1,021,277.

Specification of Letters Patent. Patented Mar. 26, 1912.

Application filed September 9, 1909. Serial No. 516,955.

To all whom it may concern:

Be it known that I, EARL H. TATE, 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 Amalgamating-Flume Table, of which the following is a specification.

Objects of this invention are:—To provide a simple effective apparatus for separating precious minerals from loose materials in which they occur; to minimize the expense of operation; to facilitate the work of clearing up the amalgam; to insure the recovery of all the material that will amalgamate, and to avoid clogging the apparatus with the gangue.

The invention may be carried out in various ways and may be embodied in more or less extensive apparatus according to the requirements of the work in hand.

The accompanying drawings illustrate the invention in the form I at present deem most practicable and most readily transformable from one character of work to another.

Figure 1 is a plan of an apparatus constructed in accordance with this invention and adapted to handle large quantities of material, as for instance the material for placer mines or of mines worked by dredges. Some of the parts of this apparatus may be used independently of other parts for the purpose of taking care of the pulp from stamp mills and other ore mills. Fig. 2 is an enlarged fragmental plan of the apparatus shown in Fig. 1. Fig. 3 is a fragmental vertical section on line x^3-x^3 , Figs. 1, 2 and 4. Parts are broken away to contract the view. Fig. 4 is a fragmental transverse section on line x^4-x^4 , Figs. 1 and 2. Fig. 5 is a longitudinal vertical section on line x^5-x^5 , Figs. 1 and 6. Fig. 6 is a fragmental plan section on line x^6-x^6 , Figs. 4, 5 and 7. Fig. 7 is a cross section on line x^7-x^7 , Figs. 4, 5 and 6. Fig. 8 is a perspective view of an amalgamating undercurrent plate corresponding to those shown in Fig. 4, except that it is constructed for use in a flume that does not have amalgamating gutters. This plate may also be used in the form of flume shown in Fig. 5.

The main flume 1 may have a semi-cylindrical bottom 2 and vertical side walls 3, 4 and may be mounted slightly aslant as for instance with a fall of one inch more or

less to a foot so that liquid therein may flow from the head-box 5 toward the tail 6. Said flume is provided in its bottom with openings 7 guarded by movable grids 7' mounted on supports 8 and operable by levers to strike against bumpers 8'.

Each of the grid-operating-levers may comprise a slotted arm 9 pivoted by a pivot 8'' in the slot of said arm to a connecting bar 8''' that is connected with a plurality of grids so that when the arm 9 is operated it will shake a plurality of grids lengthwise of the flume. Said arm 9 is mounted on rock shaft 9' to which is fixed a handle 9'' so that as said handle is operated the connecting rod and the grids pivoted thereto will be shaken lengthwise of the flume. The rock-shaft 9' is arranged transversely of the flume so that by operating the handle 9'', the grids will be shaken and caused to bump against the bumpers 8' thus to jar loose any material that may clog the grids. The grids comprise rods that extend lengthwise of the flume and said rods may be triangular in cross-section as indicated in Fig. 4; and the tops thereof may be above or near the level of the floor of the flume.

The grids afford communication from the bottom of the main flume 1 to a subway 10 which has an arched floor 11 spanning the space below the grids 7' and sloping in both directions therefrom. Said subway is provided with side walls 12 having openings 13 therein controlled by vertical slides 14 which may be operated by handles 15 accessible through the open top 16 of the subway through which the handles 9 of the grid-operating-levers are also accessible; the rock shafts 9' being mounted therebeneath in bearings 17.

At intervals along the main flume 1 are current breakers 18 pivotally mounted by means of standards 19 fixed to the current breakers at the upper ends and pivoted by pivots 20 to the side faces of the semi-cylindrical flume bottom. Said current breakers are provided on their downstream side or lower edge with ledges 21 arranged at right angles to the main body of the flume and adapted to extend down into the surface of the stream. Said current breakers may be secured as by the pivots 22 to the upper ends of the standards 19. The current breaker bodies 18 are sufficiently buoyant to remain normally at the surface of the

liquid flowing through the main flume; the purpose being to direct the current downward toward the grids.

The material flowing through the main flume 1 will be caused to drop the heavier solids and the same flowing along the floor of the main flume will find an exit through the grids excepting such material as may be too coarse to pass through the spaces of the grids. The operation of the shaker levers including the parts 9, 9' 9'' is intended to effect the removal of the clogging material from the surface of said grids in case such clogging occurs. At the sides of the subway arranged in position to receive material that may pass through the openings 13 in the side walls of the subway are side plates or tables 23 to receive the material flowing through the openings 13 and to discharge the same into the head of the amalgamating flumes 24 which are arranged transversely to the subway 10 and slant downward from such subway. The amalgamating flumes are provided at intervals with transverse mixing and amalgamating gutters 25 which comprise segmental receiving walls 26, an amalgamating segmental trough 27 and a segmental discharge wall 28. Said walls 26, 28 and trough 27 are segments of hollow cylinders. The wall 26 may be longer than the wall 28 and said walls have their concave faces directed toward each other. Midway between said walls and midway above the amalgamating trough 23 are transverse undercurrent plates 29 arranged in practically vertical planes and provided at their lower ends with foot flanges 30 that extend toward the lower concave walls 28. The amalgamating flumes 24 may be of any approved depth as for instance three inches more or less and may be of any desired width as for instance from two to thirty inches more or less. The foot flanges terminate below the level of the flat floor segments 31 of the amalgamating flume, and between the walls 26 and 28, and preferably close to the tops of the amalgamating troughs, respectively. Consequently any pulp flowing down the amalgamating flumes must pass into intimate contact with the quicksilver charges 32 in said amalgamating troughs. Each of said amalgamating troughs stands slightly aslant and transverse of the amalgamating flumes, and at its lower end there is provided a trough 33 that may be provided with a goose-neck 34 controlled by a valve 35 so that when occasion requires, the amalgam may be drawn off through the goose-neck. An amalgam trough 36 may be fastened to the lower side walls 37 of the amalgamating flumes to extend beneath the gooseneck 34 to receive the material discharged therefrom. The charge of quicksilver or fluid mercury 32 constitutes a fluid

rifle upon which the pulp is forced to impinge by the undercurrent plates 29 and the pulp flowing down the concave walls 26 at the upper sides of the undercurrent plates is directed down upon the fluid rifle which will be agitated and scoured thereby and as the pulp passes on into contact with the concave lower wall 28 and rides above said wall, an eddy is formed for the purpose of precipitating any material that the current may have carried up behind the undercurrent plate. The material that may be amalgamated is thus brought into intimate contact with the quicksilver and any values that may escape may be caught in the next riffle and so on to the end of the amalgamating flume. Said amalgamating flume may be of any desired length and may be supplied with any determined number of riffles within the judgment of the constructor. The undercurrent plates may be mounted in any suitable way and are preferably carried by a frame 38 resting on brackets 39 that are secured by bolts or rivets 40 to the outer walls of the amalgamating flume.

When it is desired to draw off amalgam this may be done in the usual way by opening the faucets 35 and turning the gooseneck into discharging position. When it is desired to make a final clean-up and to remove from the interior of the amalgamating flumes any values that may be thereon, the undercurrent plates may be lifted out of the amalgamating flumes thus giving perfect access to the flat floor plates 31 and to the interior of the amalgamating troughs.

The undercurrent plates as well as all the other surfaces of the amalgamating flume may be silver-plated and coated with mercury to catch the precious metal. The undercurrent plates may also be provided with supplementary amalgamating troughs 41 and with perforations 42 and the supplementary undercurrent plates 43 may be provided at their tops with hooks 44 to hook over brackets 45 on the main undercurrent plates 29, so that when it is desired to clean up the supplementary troughs 41, the supplementary plates 43 may be lifted out of said troughs. The supplementary troughs 41 are adapted to contain mercury and are arranged on one side of the plate to deliver liquid to the openings.

In practice, any desired number of supplementary troughs may be arranged on the main undercurrent plates 29, thus to increase the capacity of the machine, the lighter float gold that may flow through the upper troughs being caught by the mercury therein. The walls of the supplementary troughs may be soldered or otherwise fixed to the main undercurrent plates, and the ends of said troughs are closed so as to hold their

mercury charges without loss. Any leakage that may occur, however, may be caught by the troughs 27.

It is understood that the valve 35 and trough 36 may be omitted, the closing of the amalgamating trough 33 being effected in any well-known way; or the openings there-through may be wholly omitted without avoiding the principle of this invention.

The flumes and other parts of the apparatus may be constructed of any suitable material and the operation of recovering minerals by the use of said apparatus may be conducted within the judgment of the operator in accordance with the general principles of the art in analogous cases. The amalgamating flumes may be applied to a launder of a stamp mill or other ore crusher and may take the place of the amalgamating plates commonly used.

The amalgamating under-current plates 29' and 29'' may be removably mounted by any suitable means, as by cleats 46 fixed to the frame 38, and hooks 47 fixed to the amalgamating undercurrent plates and hooked over the cleats 46 when the amalgamating undercurrent plates are against the upstream sides of the cleats. In Fig. 8 the undercurrent plate 29'' has downwardly extending feet 47' for its support, thus providing an undercurrent way 46' beneath the main body of the plate. The plates 29', 29'' may, therefore, be inserted into and removed from the amalgamating flume by simply lifting them up out of the frame 38. Said frame may be locked in the amalgamating flume by a padlock 48 passed through the eye 49 of an eye-bolt 50 inserted through the frame and the wall of the amalgamating flume 24.

When it is desired to clean up the amalgamating flume the frame may be unlocked and drawn out with all the undercurrent plates thus giving access to the troughs 27.

The form of the amalgamating troughs 27 may be varied within the judgment of the constructor by making the same semi-cylindrical as shown in the drawings and provided with concave walls at the sides above the edges of the troughs. The force of the current relative to the liquid riffle formed by the charge of mercury is such as to bring the heavier material flowing beneath the undercurrent plates into intimate contact with the surface of the mercury. The edges of the semi-cylindrical troughs are preferably on a level with each other, the concave walls 26 and 28 of the gutter being of different heights to conform to the slope required for the bottom of the amalgamating flume.

By arranging the stationary under-cur-

rent plate 29 between the concave walls 26, 28, and terminating the same close to the mercury level of the trough a nozzle-like effect upon the liquid passing through the flume is caused so that the liquid is forcibly driven against the mercury and tends to displace the same, the foot flanges 30 prolonging the action of the liquid upon the mercury.

It is apparent that the liquid passing down in the direction with the air from the character 25 in Fig. 5 will tend to displace the mercury on the up-stream side of the under-current plate 29 and that there is no obstruction to break the force of the liquid as it passes down the nozzle-like entrance to the amalgamating segmental trough 27.

I claim:—

1. An amalgamator comprising a flume, a series of transverse troughs along the floor of the flume to contain mercury and undercurrent plates across the flume to direct the current into such troughs; said undercurrent plates being provided with supplementary mercury troughs, and means to cause a flow of material thereacross.

2. The combination with a flume of transverse plates extending across the flume, troughs on said plates adapted to contain mercury and supplementary undercurrent plates in said troughs, said transverse plates being provided with openings above the bottoms, of the troughs to allow liquid to pass therethrough.

3. The combination with a flume, of a transverse plate therein provided with an opening, a trough on said plate adapted to contain mercury and an undercurrent plate in the trough to direct the current down upon the mercury.

4. The combination with a flume, of a transverse plate therein provided with an opening, a trough on said plate adapted to contain mercury and a detachable undercurrent plate in the trough to direct the current down upon the mercury.

5. The combination with a flume, of a transverse plate in said flume the same being provided with openings arranged at different levels, troughs adapted to contain mercury arranged on one side of said plate to deliver liquid to said openings, and means to direct the current onto the mercury in said troughs.

In testimony whereof I have hereunto set my hand at Los Angeles, California, this 2d day of September, 1909.

EARL H. TATE.

In presence of—

JAMES R. TOWNSEND,
L. BELLE RICE.