2 Sheets—Sheet 1.

J. H. WILHELM.

Ore Washing and Amalgamating Machine.

No. 196,174. **Patented Oct. 16, 1877.**

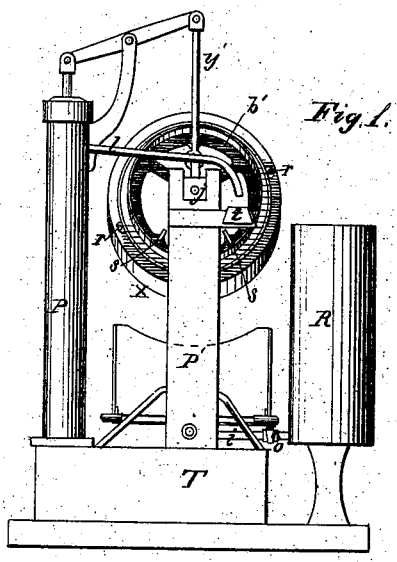


Fig. 1.

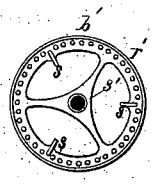


Fig. 2.

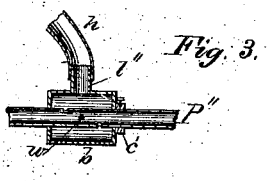


Fig. 3.

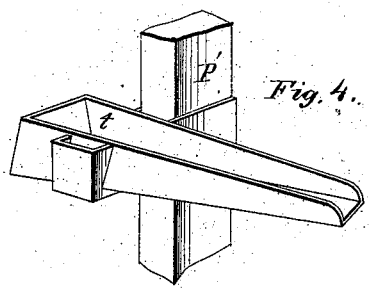


Fig. 4.

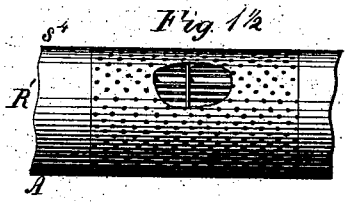
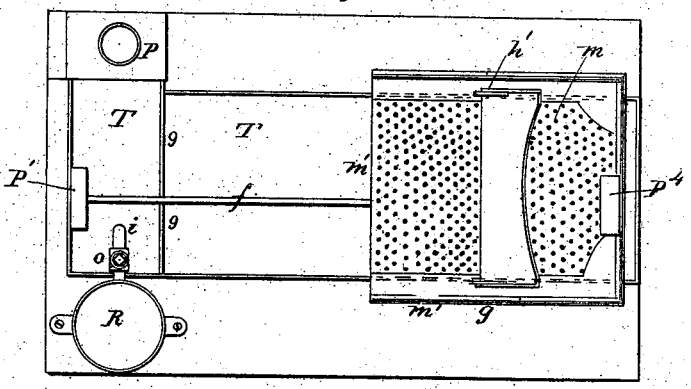


Fig. 1½

Fig. 5



Witnesses
Jacob A. J. Bigler
Orson Brooks

Inventor
John H. Wilhelm

2 Sheets—Sheet 2.

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Ore Washing and Amalgamating Machine.

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Fig. 6

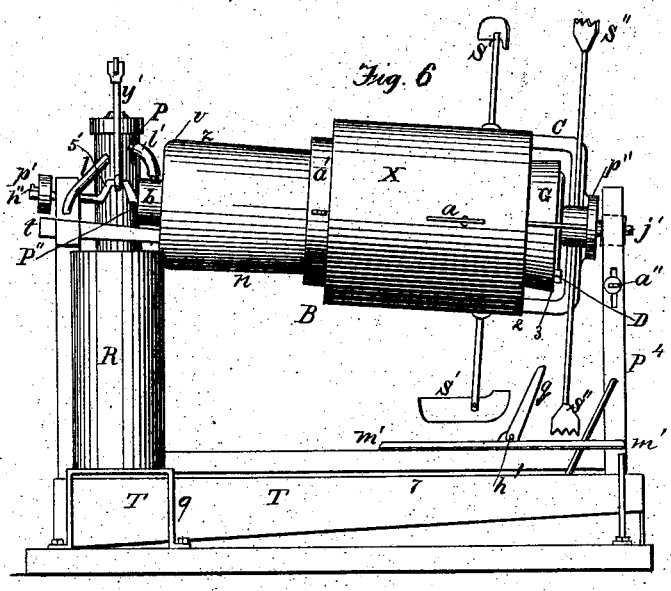


Fig. 7.

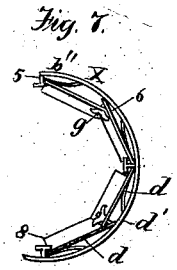


Fig. 12.

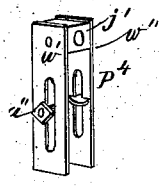


Fig. 8

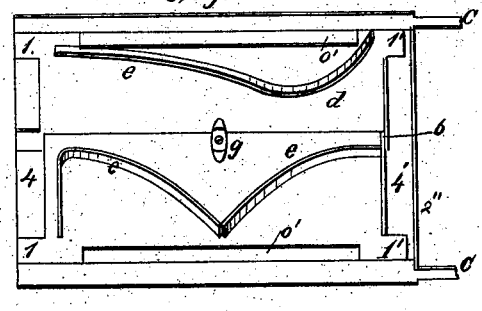


Fig. 9.

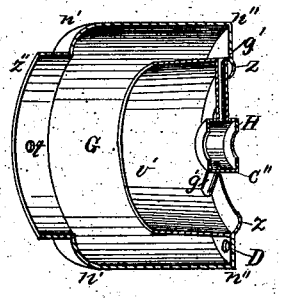


Fig. 10.

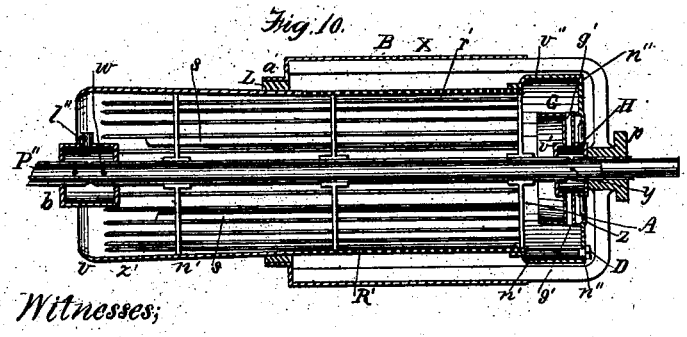
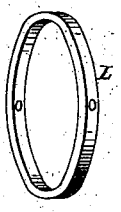


Fig. 11.



Witnesses;

Jacob A. J. Bigler

Olson Brooks

Inventor

John H. Wilhelm

UNITED STATES PATENT OFFICE.

JOHN H. WILHELM, OF DENVER, COLORADO.

IMPROVEMENT IN ORE WASHING AND AMALGAMATING MACHINES.

Specification forming part of Letters Patent No. **196,174**, dated October 16, 1877; application filed October 24, 1876.

To all whom it may concern:

Be it known that I, JOHN H. WILHELM, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Improved Ore Washing and Amalgamating Machine, which I will call the "Adjustable Amalgamator;" and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is an end view of my machine; Fig. 1½, a longitudinal view of the screen; Fig. 2, an end view of the wheel-supports; Fig. 3, a sectional view of the shaft and distributing-cup; Fig. 4, a perspective view of the trough or chute into which the dirt is thrown; Fig. 5, a plan view of the machine; Fig. 6, a side view of the machine; Fig. 7, a transverse section of the external cylinder, showing the amalgamated plates; Fig. 8, a plan view of the exterior cylinder and plates; Fig. 9, a perspective section of the cap; Fig. 10, a longitudinal view of both cylinders and cap; Fig. 11, a perspective of the ring; Fig. 12, a view of the movable plates.

The object of my invention is to separate and gather the native gold, both coarse and fine, from the auriferous débris of placer-mines where there is a scarcity of water, or where it cannot be had without great expense in sufficient quantity to collect the gold by the ordinary methods.

The gravelly or clayey dirt containing the metallic gold is thoroughly tumbled and dashed about, and constantly kept in contact with a sufficient supply of water, thus using a comparatively small quantity to great advantage, and the fine flour, scale, and float gold subjected to such thorough contact with a series of amalgamated plates as to save the finest particles.

The machine is so constructed that it can readily be adjusted to all kinds of dirt by giving it a less or greater inclination, and thus wash the auriferous débris more or less thoroughly, as from its character may be required.

The position of the machine with reference to the supply of water is such as to allow the surplus or waste water that drains from the tailings readily to flow back to the pump, where it may be re-used, it being an object, while saving the gold, also, as much as possible, to save the water. The economizing of labor, also, is attained in the mechanism of the machine, it being provided with the means of disposing, to some extent by its own action, of the tailings, and in being so constructed as to be taken apart easily, thus rendering it portable.

The machine is supported by a shaft, P″, Figs. 3, 6, 10, revolving in the adjustable journal-boxes *j j′*, resting on the posts P^1 P^4, Figs. 1, 6. It is placed over the water-tank T, Figs. 1, 6. *n*, Figs. 1, 6, 10, is a water-tight metallic cylinder, of any desirable length and diameter, gradually expanding from some point, as *z′*, into the receiver *v*, and prolonged from *a′* into the metallic screen R′ and short cylinder A, Figs. 1½, 6, 10. The wheel-supports, Fig. 2, are placed at suitable distances apart in the cylinder *n*, screen R′, and cylinder A. The metallic bars *r′*, Figs. 2, 10, extend throughout *n* R′ A, Figs. 1½, 6, 10. Being placed at short distances from each other, they form narrow troughs that aid in distributing the water more equally through *n*. The bars *r′* may be made of any suitable size and style. *s*, Figs. 1, 2, 10, represents flat iron bars of greater width, forming narrow shelves that aid, when *n* and R′ are revolving, to elevate the dirt and water, allowing them to fall gradually onto the mass below, thus subjecting it to a thorough scouring and washing.

The rim *b′*, Fig. 2, made of cast-iron or any suitable material, forms a projection that catches more or less coarse gold as the débris passes through *n* R′ A.

R′, Fig. 1½, is designed to allow the fine gold, water, and the finest portion of the débris to pass through its perforations into the cylinder X. The coarser portion of the gravel and sand, with some water, travels on and falls as tailings at 3, on the screen *m′*, Fig. 6. The screen R′ terminates in a cylinder, A, Fig. 1½.

The object of incasing the bars *r′*, Figs. 1½, 2, 10, at the termination of R′, forming A, (similar to *n*, and of which it may be regarded as a detached section, separated from *n* by R′,) is to retain an abundance of water, so as to

more thoroughly wash the dirt before it passes out of the machine, causing the gold, or a portion of it, to lodge against the rim *b'*, Fig. 2, placed at s^4, Fig. 1½, at the end of A, and effectually washing the débris as it travels out of the machine, causing the lighter particles to fall as tailings at 3, on the screen *m'*, Fig. 6, and the heavier to find their way into the nugget-box 9', Fig. 10. A also affords a substantial base for the cap G, Figs. 6, 9, 10.

G, Figs. 6, 9, 10, is a movable metallic cap of greater diameter than R', Figs. 1½, 6, 10, which is the same diameter as A, Figs. 1½, 10. G is of less diameter than X, and contains a receptacle or nugget-box, 9', Fig. 10, for coarse gold.

H, Figs. 9, 10, is a hub or box into which water is conveyed by P'', Figs. 3, 6, 10. *c''* is the open end of the hub H.

v', Figs. 9, 10, is the inner side of the receptacle 9', Fig. 10. *v''*, Figs. 9, 10, is the outer side of 9', Fig. 10.

The diameter of G is greater from *n''* to *n'''*, Figs. 9, 10, than from *n'* to *n'*, Figs. 9, 10.

The opening or mouth of the receptacle 9', Fig. 10, is made as narrow as the size of the nuggets will permit, in order to prevent large bowlders from falling into the box 9'.

x'', Fig. 9, is the band that is slipped over A, Figs. 1½, 6, 10.

t', Fig. 9, shows the hole for the set-screw, by means of which G is fastened to A.

z, Figs. 9, 10, is a narrow curved band, attached around the outer end face of the cap G, at a right angle, or nearly so, to the wider end of *v'*, and projects toward the hub H, Figs. 9, 10, forming a circular dish, designed to prevent the water from escaping too rapidly with the débris out of the machine between the spokes *g'* of the cap G, Figs. 9, 10.

D, Figs. 6, 9, 10, is a screw, forming a water-tight door, opening into 9', Fig. 10, and is made of sufficient size to admit the hand easily for the purpose of removing the gold from G without unshipping the machine.

X, Figs. 1, 6, 10, is an exterior cylinder, incasing R', Figs. 1½, 6, 10, and contains the amalgamated plates shown at *d d*, Figs. 7, 8. It is supported by the crane C, to which is attached the pulley *p''*.

The plates *d d*, Fig. 7, are plane surfaces, having the ends 8 next to the posterior end of *x* turned up, so as to prevent the contents of *x* from passing out too rapidly.

o', Fig. 8, represents portions of plates *d* cut away, exposing the surface of cylinder X beneath.

4 4', Fig. 8, represent spaces on the inside surface of *x* not covered by *d d*.

The plates *d d*, when placed within *x* overlap each other, as shown at 6, Figs. 7, 8. They are so arranged as to form an interior cylinder, and are firmly secured by means of the T-shaped ledges of the longitudinal strips shown at 5, Fig. 7, and the screw *y*, Figs. 7, 8, the projections 1 1 1' 1' of the plates *d d* resting against the rims 2' 2'' of *x*, Fig. 8.

d', Fig. 7, represents a bucket formed by the overlapping plates *d d*, and is designed to aid in conveying a portion of the contents of *x* upward with the revolution of the cylinder, allowing a part of them to fall through the open space formed by *o'* on screen R' and the plates *d d* below, Figs. 7, 8, thus resupplying the contents of R', Figs. 1½, 6, 5, 10, with a portion of the water that escaped through the perforations of the screen, and also bringing the fine gold into more extensive contact with the amalgamated surface, the plates *d d* being thoroughly amalgamated on both sides. On some of the plates *d d*, Fig. 8, are vertical projections *e e*, set at right angles, or nearly so, to the plane faces of the plates *d d*, forming restraining-ledges on buckets, the object of which is to aid in conveying a portion of the water and débris upward with the revolution of *x*, causing them to roll or fall on the plates below and on the screen R', thus not only bringing the fine gold into more thorough contact with the amalgamated surface, but also resupplying R' with a portion of the water that escaped through the perforations of the screen.

I do not confine myself to any special shape of the vertical projections *e e*, Fig. 8, but use them of any curve, angle, or style, so as to form water-shelves, that accomplish the results above attributed to their action.

b'', Fig. 7, shows the supports of the plates *d d*.

The tailings from *x* fall at 2 on *m'*, Fig. 6. *s' s''* are sweeps, designed to brush off the tailings from *m'* that fall at 2 and 3, Fig. 6. The sweeps *s'* are fastened securely by any suitable means to *x*, and the sweep *s''* to the hub of the crane C, Fig. 6. *s' s''* may be screwed into the arms and hub of the crane C, so as to be removed at pleasure.

When it is desirable to throw the tailings farther than the velocity necessary to work *x* satisfactorily will accomplish, *s' s''* may be attached to any effective separate device, and made to revolve more rapidly in the same manner around *x*.

It will often be convenient to reverse the motion of *x* for the purpose of sweeping the tailings in the opposite direction.

P''', Figs. 3, 6, 10, is a hollow shaft, supporting the interior cylinder B, formed by *n* R' G, Figs. 6, 10, and the exterior cylinder X. P''' is securely fastened to the wheel-supports at 3', Fig. 2, said supports being located at intervals within the inner cylinder, and revolve in the journal-boxes *j j'*, Figs. 1, 6.

y, Fig. 10, shows the perforations in P''', where it revolves in the hub H, Figs. 9, 10.

b, Figs. 3, 6, 10, represents a distributing-cup resting on P''' against the collar *c'*, Fig. 3. *l'''*, Fig. 3, is a spout attached to *b*, and connected by the hose *h*, Fig. 3, to *l'*, one of the spouts of the pump P, Fig. 6. *w*, Figs. 3, 10, represents perforations in P''', through which the water passes from the distributing-cup *b*, in which P''' revolves into P''', through which it is

conveyed and discharged into the hub H, and the hollow spokes g', Figs. 9, 10, into 9′, Fig. 10.

P, Figs. 1, 5, 6, is a pump, placed in the tank T. l, Figs. 1, 6, is one of the spouts of P.

t, Figs. 1, 4, 6, is a movable trough or chute, attached to the post P′ or any firm support, and extending into the receiver v, Figs. 6, 10. The auriferous dirt is thrown into t, which, by means of its inclination and the force of the stream of water from l, Figs. 1, 6, conveys the dirt into the receiver v, Figs. 6, 10.

When the dirt is dry, if the inclination of t is sufficient it will slide into the receiver v better without water, unless a strong current be used. The spout l may then be turned directly into v.

p', Fig. 6, is a pulley attached to the shaft of P″ by the key h''.

a, Fig. 6, shows the place on x where s' is fastened.

a'', Figs. 6, 12, is a screw used to hold the movable plates w' w'', Fig. 12, between which j' is fastened, and by means of which the inclination of the machine is adjusted.

q, Figs. 5, 6, is a chute hung on the hinge h'. It is made of any suitable material, and may be covered with an amalgamated plate, so as to catch any fine gold-dust that may happen to escape with the tailings from x. Ordinarily it will not be necessary to amalgamate q.

7, Fig. 6, represents a screen placed under, and at a short distance from, the screen m', Figs. 5, 6. The screen 7 is some additional aid in separating the water from the finest portion of the tailings. Either m' or 7 will generally alone be sufficient.

When necessary, both 7 and m' may be made of copper-wire cloth, and amalgamated. Generally this will be useless.

9, Figs. 5, 6, is a partition separating T into compartments, to aid in clarifying the water that has been used.

R, Figs. 1, 5, 6, is a reservoir of any desired capacity.

The operation of the machine has, to some extent, been explained in the foregoing description. Any convenient effective power is applied to the machine by means of the pulleys p' p'', Fig. 6. The water regulated by the faucet o, Figs. 1, 5, runs from R, Figs. 1, 5, through the pipe i into T as fast as it is pumped up by P, Figs. 1, 5, 6. Any ordinary suction or force pump may be used. When the débris requires a strong current through the nugget-box 9′, Fig. 10, the latter will be needed.

In localities where water is abundant the tank T and reservoir R may be dispensed with, and where a stream of water a half inch or more in diameter, falling from a height of fifteen or more feet, can be obtained, the pump P may be dispensed with.

f, Fig. 5, is a base rod connecting standards P^1 and P^4. The interior cylinder B, Fig. 6, formed of n R′ G, Figs. 1½, 6, 9, 10, may be fastened to X by means of a set-screw by placing the ring L, Figs. 10, 11, under the band a', Figs. 6, 10, and thus x and B will be made to revolve together in either direction, or the ring L may be slipped up to z', Figs. 6, 10, and the cylinders made to revolve independently of each other.

It is evident, from well-known methods of transmitting the power to p' p'', which it is not deemed necessary to describe here, that B and x may be made to revolve in the same direction with the same or with different velocities, or in opposite directions with the same or with different velocities, or either may be made to perform part of a revolution and then be immediately reversed. The character of the auriferous débris must determine the nature and velocity of the revolutions of B and x. Generally a slow motion produces the best results.

The pump-handle y', being attached to 5′, Fig. 6, the solid bent part of the shaft P″, the same power that turns the machine also pumps the water. The journal-box j, Fig. 1, turns freely on a pivot fastened permanently in a slit in the top of the postP′, Fig. 1, so as to allow the journal-box j', Figs. 1, 12, that sets in a slit in the top of P^4, to be elevated or lowered at pleasure by means of the screw a'' and plates w' w'', Figs. 6, 12. The auriferous dirt is thrown into the chute t, and passes through n R′ G, Figs. 1½, 6, 9, 10, the fine gold and sand and a portion of the water escaping through the perforated cylinder R′ into x, Figs. 1½, 6, 10.

The stream that passes through the hollow shaft P″ furnishes an abundance of water effectually to wash up, by the aid of the motion of G, the gravel and sand out of nugget-box 9′, Figs. 9, 10, allowing the gold to remain by reason of its greater specific gravity.

To secure the best results the amalgamated plates in x should be kept in prime condition, and to economize time, while cleaning them, may be replaced with a second set.

As the metallic cylinder x may be of any convenient diameter, one or more interior amalgamated cylinders may be arranged within it, and, if desired, the inner surface of x may itself be amalgamated. Amalgamated copper-wire cloth may also be placed around the screen R′. So much extra amalgamated surface will seldom, if ever, be required.

I am aware that cylinders and screens have been used for scouring and washing purposes, and that amalgamated plates have been used to catch gold. I therefore disclaim these.

What I claim as new, and desire to secure by Letters Patent, is—

1. The inner revolving cylinder, consisting of the expanded receiving portion v, the water-tight portion n, the screen R, and the end piece A.

2. The cap G, substantially as described, and for the purpose set forth.

3. The inner revolving cylinder B, consisting of the expanded receiving portion v, the water-tight portion n, the screen R′, the end piece A, and the cap G, in combination with

the hollow perforated shaft P″, the distributing-cup *b*, provided with the spout *l″*, and the hose-pipe *h*, substantially as described, and for the purpose set forth.

4. The amalgamated plates *d d*, having the buckets *e e*, substantially as described, and for the purpose set forth.

5. In combination with the inner cylinder X, the series of amalgamated plates *d d*, arranged relatively thereto, as described, whereby the contents of X are permitted to pass around the ends of the plates and through their open spaces freely over both sides of the interior amalgamated cylinder.

6. The exterior cylinder *x*, in combination with the interior cylinder of amalgamated plates *d d*, substantially as described, and for the purpose set forth.

7. The combination of the interior cylinder B with the exterior cylinder *x* and the interior cylinder of amalgamated plates *d d*, substantially as described, and for the purpose set forth.

8. The sweeps *s′ s″*, in combination with the outer revolving cylinder *x*, substantially as described, and for the purpose set forth.

9. The inner revolving cylinder B, consisting of the expanded receiving portion *v*, the water-tight portion *n*, the screen R′, the end piece A, and the cap G, in combination with the outer revolving cylinder *x*, the sweeps *s′ s″*, the interior cylinder of amalgamated plates *d d*, the screen *m′*, the screen 7, the chute *q*, the hollow perforated shaft P″, the distributing-cup *b*, provided with the spout *l″*, and the hose-pipe *h*, the reservoir R, the tank T, the pump P, the pulleys *p′* and *p″*, and the adjustable apparatus represented by the screw *a″*, the movable plates *w′ w″*, and the journal-boxes *j* and *j′*.

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