No. 836,148. PATENTED NOV. 20, 1906.

J. J. SOUTHWICK.

GOLD WASHER AND AMALGAMATOR.

APPLICATION FILED OCT. 19, 1905.

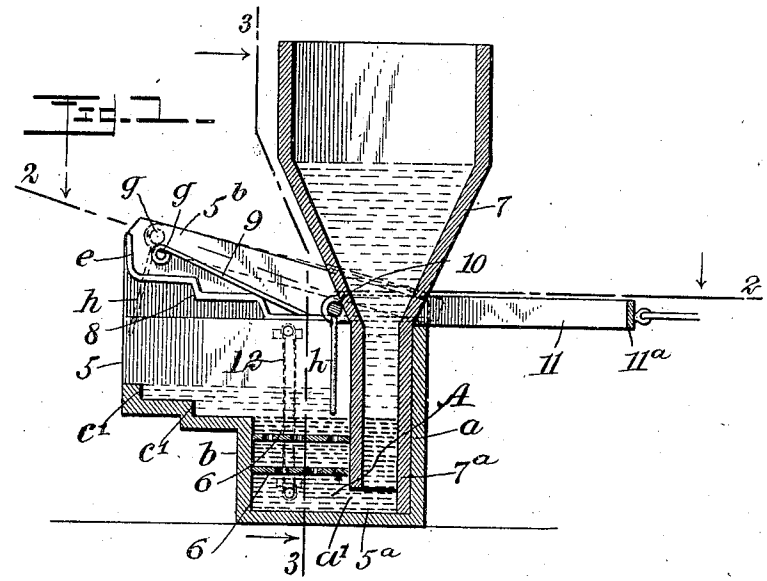


FIG. 2.

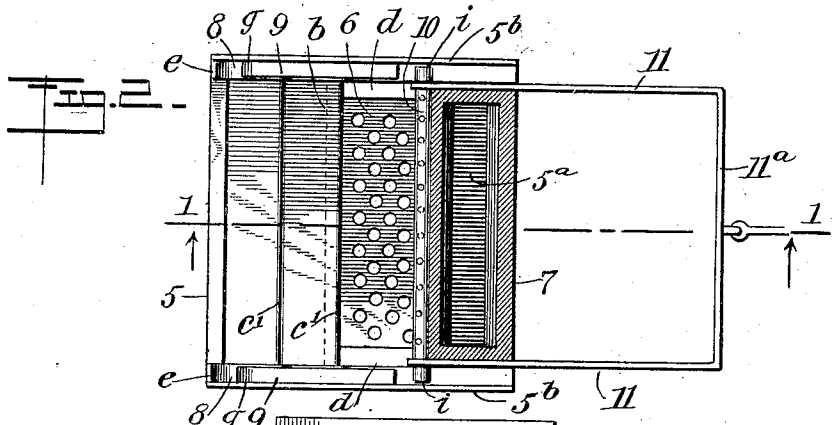
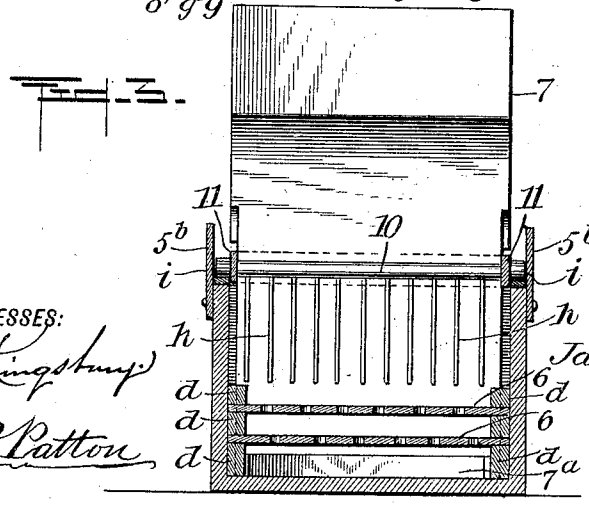


FIG. 3.



WITNESSES:

Geo. O. Kingsbury

Wm. P. Patton

INVENTOR

James J. Southwick

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

JAMES J. SOUTHWICK, OF GREAT FALLS, MONTANA, ASSIGNOR OF ONE-HALF TO MAX I. GOLDSTEIN, OF GREAT FALLS, MONTANA.

GOLD WASHER AND AMALGAMATOR.

No. 836,148. Specification of Letters Patent. Patented Nov. 20, 1906.

Application filed October 19, 1905. Serial No. 283,407.

To all whom it may concern:

Be it known that I, JAMES J. SOUTHWICK, a citizen of the United States, and a resident of Great Falls, in the county of Cascade and State of Montana, have invented a new and Improved Gold Washer and Amalgamator, of which the following is a full, clear, and exact description.

This invention relates to means for saving fine gold that is in flakes, and which in washing pay dirt is ordinarily floated and carried away with the water used to separate values from the dirt.

The invention consists in the peculiar construction of a gold washing and amalgamating apparatus and in the novel method for amalgamating gold that is washed from waste matter as the rich dirt is passed through the machine.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side view taken substantially on the line 1 1 in Fig. 2. Fig. 2 is a partly-sectional plan view substantially on the line 2 2 in Fig. 1, and Fig. 3 is a transverse sectional view substantially on the line 3 3 in Fig. 1.

In the drawings, 5 indicates a sluice-box of rectangular contour and any cubical capacity that may be preferred. An amalgamating-chamber 5^a is formed at one end of the sluice-box, having a suitable depth, and, as shown, the transverse end wall *a* of the sluice box forms a corresponding end wall for the chamber. The front transverse wall *b* of the amalgamating-chamber 5^a is arranged parallel with the rear end wall *a* and preferably is about one-half of the height of said wall. From the upper edge of the front wall *b* extends forwardly a stepped bottom board *c*, formed with transverse riffles *c'*.

In the chamber 5^a, on the opposite side walls thereof, a plurality of spaced cleats *d* are formed or secured, there being an equal number on each side wall. As shown, three strips or cleats *d* are provided for each wall; but this number may be increased if it is found necessary. The cleats *d* are so spaced apart in parallel planes that two horizontal channels are formed between the set of cleats on each side wall, and in each pair of opposite channels a screen-plate 6 is loosely inserted, thus disposing two similar screen-plates in the amalgamator-chamber 5^a, which plates extend of a proper width from the front wall of said chamber rearward and have a suitable degree of separation. The screen-plates 6 are perforated at proper intervals of separation throughout their areas, and it is preferred to arrange the perforations in one plate, so that they will not be directly opposite those in the other screen-plate, as is indicated in Fig. 1. The screen-plates 6 are formed of sheet-copper of proper thickness and are coated with mercury amalgam throughout their areas. The width of the screen-plates between their front and rear edges permits a free introduction of the same between the cleats *d* by passing them from the rear forwardly in the intervening channels, and, as shown, the length of the cleats *d* and width of the plates 6 from front to rear permit a rectangular space to intervene between them and the rear wall *a* of the chamber 5^a.

A rectangular conduit for pay dirt is employed comprising a hopper-box 7, which converges toward the lower end thereof, and from the lower end of the hopper-box a rectangular feed-pipe 7^a extends as a continuation of the same. The feed-pipe 7^a is adapted to fit loosely in the space within the chamber 5^a behind the screen-plates 6, and it will be seen that the contact of the rear wall of the hopper-box upon the upper edge of the rear wall *a* and rear ends of the cleats *d* serves to maintain the conduit upright when inserted into position for service.

It will also be noted in Fig. 1 that the length of the feed-pipe 7^a is so proportioned in relation to the depth of the sluice-box at the rear end that a suitable space *a'* is afforded between the lower end of said feed-pipe and the bottom of the amalgamating-chamber 5^a.

On the upper portions and outer surfaces of the sides of the sluice-box 5 two similar upright guard-wall plates 5^b are secured, which extend from the front ends to the rear ends of said side walls.

A stepped trackway 8 is formed or secured on the inner surface of each guard-wall plate 5^b, as is shown for one trackway in Fig. 1. The steps of the similar trackways ascend toward the front ends of the guard-walls, and

each terminates forwardly in an upright abutment-flange *e*.

A straight track-bar 9 is pivoted at its front end upon the inner surface of each guard-wall plate 5^b, and, as appears in Fig. 1, the point *g* of pivotal engagement for each track-bar is spaced somewhat from the upper side of the respective trackway 8 and also from the abutment-flange *e*, which is adjacent thereto.

Each track-bar inclines downward and rearward, as shown for one track-bar in Fig. 1, and at the loose rear end rests upon the upper edge of a respective side wall of the sluice-box 5.

A rake consisting of a head-bar 10, having spaced teeth *h* projected therefrom, is secured by ends of the head-bar upon the ends of a rectangular yoke-frame comprising two side arms 11 11 and a spacing cross-bar 11^a, as indicated in Figs. 1 and 3. The arms 11 have such separation in parallel planes that they are permitted to loosely embrace the opposite sides of the hopper-box 7, and thus dispose the rake head-bar 10 and the depending teeth thereon in front of the hopper-box. The ends of the head-bar 10 extend outside of the arms 11 sufficiently to form trunnions *i*, which when the rake-teeth *h* are drawn into a rearward position near the hopper-box 7 rest upon the upper edges of the sides of the sluice-box 5, as indicated in Figs. 2 and 3.

It will be evident that if the rake is in the position shown in Fig. 1 and subsequently is pushed forward the trunnions *i* will slide upon the inclined track-bars 9 and drop from the front ends of said track-bars upon the upper steps of the stepped trackways 8, the abutment-flanges *e* preventing an improper forward travel of the trunnions. The raking operation is continued by a reversed movement of the rake and its operating-frame, which will cause the trunnions *i* to slide down the stepped trackways 8 until they lift the free ends of the inclined track-bars 9 and pass from beneath them. The teeth of the rake are of such length that they clear the stepped bottom board *c* when the rake is reciprocated and also have clearance from the upper screen plate 6.

Preparatory to the operation of the improved apparatus there is a sufficient quantity of quicksilver A placed in the amalgamating-chamber 5^a to fill it and cover the uppermost screen-plate 6. The fine pay dirt that may be pervaded with flake gold or very fine granular gold that in the ordinary gold-washer apparatus is generally floated away is now mixed with water, so as to render it nearly liquid or quite so, the mixture being well stirred to remove coarse refuse matter. The mixture of pay dirt and water is now poured down into the hopper-box 7, falling into the lower end of the feed-pipe 7^a, from which it passes forwardly through the opening *a'*, this being due to the force of gravity, which when the hopper-box is nearly full serves to press the liquid pay dirt through the quicksilver A and below the lower screen-plate 6.

It will be observed that the granular or fine gold carried in suspension along with the water will be brought into intimate contact with the quicksilver A and be amalgamated therewith, and as the water together with sand and other light impurities are carried upward through the screen-plates 6 the sifting action and mercury coating of said plates will cause such fine gold as contacts therewith to adhere and be coated thereon.

A gage 12 (shown by dotted lines in Fig. 1) indicates on the exterior of the sluice-box the height of the liquid pay dirt in the chamber, and thus enables a proper feed of the same down through the pipe 7^a to be manually effected, or the same may be rendered automatically continuous by any suitable means.

The rake and its actuating-frame may be reciprocated by any preferred means, and it serves to agitate the water and sand as it passes over the bottom board *c*, so that any gold that may be coated with dirt that prevented the grains from being amalgamated by its heft will be lodged against the riffles *c'*, and thus be saved.

At any time it is desired the gold and mercury amalgam may be removed from the apparatus and subsequently heated in a suitable retort and condenser, vaporizing the mercury that leaves the gold, as is usual in such treatment of amalgamated values for the separation of precious metal from mercury, and of course the mercury when cooled in a proper receptacle will resume its normal condition ready for reuse. The gold that may have been amalgamated with the mercury coating on the screen-plates 6 may be separated therefrom by heating the plates so as to vaporize the mercury.

It will be seen that the method for introducing the liquefied pay dirt into and then upwardly through a mercury-bath by gravity of a column of the liquid pay dirt is perfect in principle, as it prevents the loss of any gold from pay dirt no matter how fine and flaky it may be, and this method is a feature of the invention.

It is obvious that the means for stirring the liquid pay dirt may be somewhat modified within the scope of the invention, and I claim all such changes in the constructive details of the apparatus as fairly fall within the scope of the claims.

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

1. In apparatus of the class described and in combination, a sluice-box, an amalgamating-chamber communicating therewith, a plurality of vertically-spaced screen-plates in

the amalgamating-chamber, a stepped bottom board provided with a plurality of riffles leading from the amalgamating-chamber, a conduit-pipe having a hopper-box on its upper end and held erect in the chamber at the rear of the screen-plates, said conduit-pipe having an opening at its front and lower end, and an agitating device comprising a transversely-disposed rake, means for reciprocating said rake, and means for guiding said rake in one direction in lines parallel with the stepped bottom.

2. In apparatus of the class described and in combination, a sluice-box, an amalgamating-chamber communicating therewith, a plurality of vertically-spaced screen-plates in the amalgamating-chamber, a stepped bottom board having a plurality of riffles leading from the amalgamating-chamber, a conduit-pipe communicating with the amalgamating-chamber, and an agitating device comprising a transversely-disposed rake, means for reciprocating said rake, and means for guiding said rake in one direction in lines parallel with the stepped bottom.

3. In apparatus of the class described, a sluice-box provided with an amalgamating-chamber, a stepped bottom board having a plurality of riffles and leading from the amalgamating-chamber, a rake, means for reciprocating the rake over the bottom board, and means for guiding the rake in one direction in lines parallel with the stepped bottom.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES J. SOUTHWICK.

Witnesses:
A. C. GORMLEY,
J. WEINBERGER.