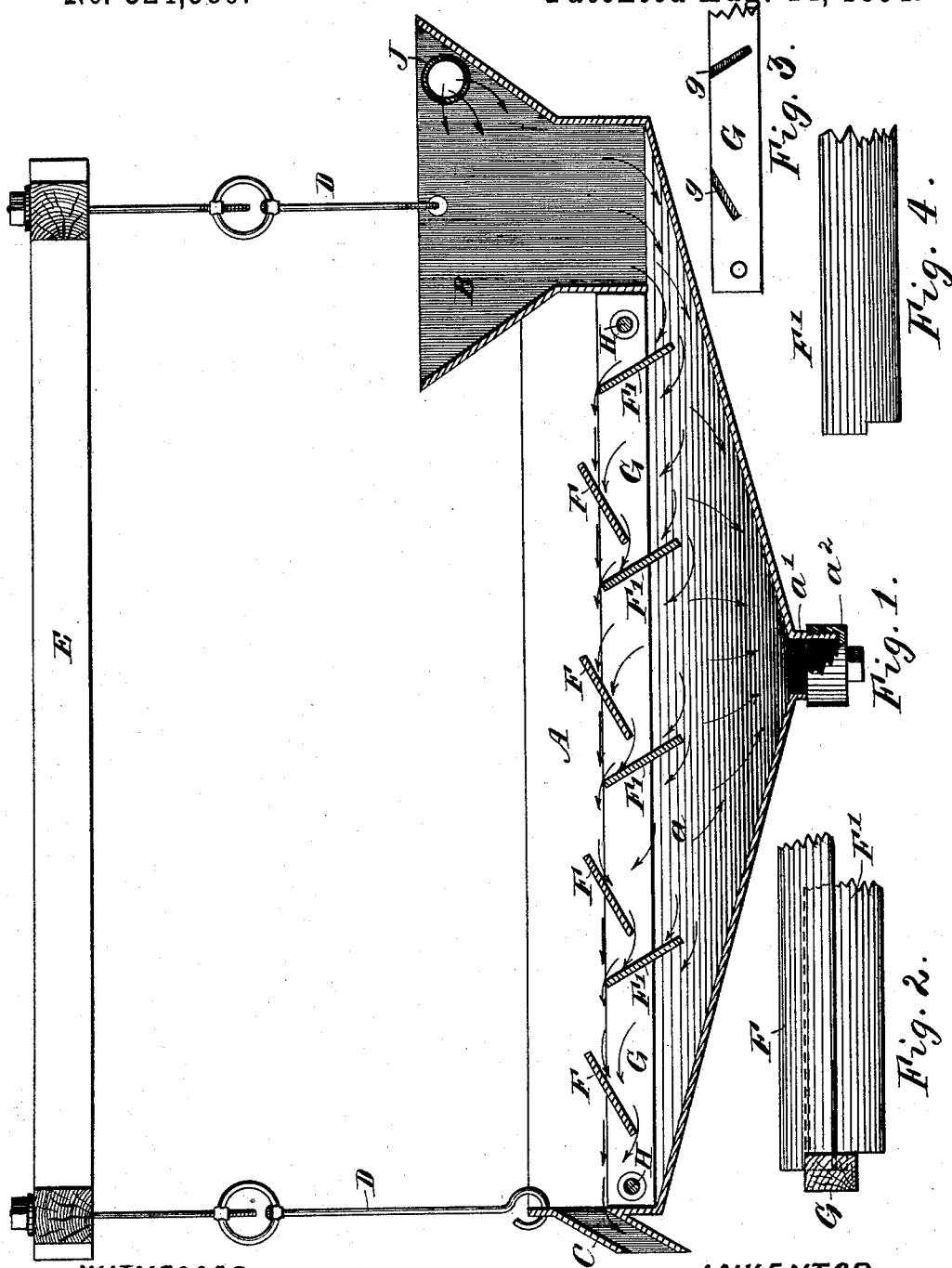


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ORE CONCENTRATING AND GOLD SAVING APPARATUS.

No. 524,586.

Patented Aug. 14, 1894.



WITNESSES:

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Fig. 5.

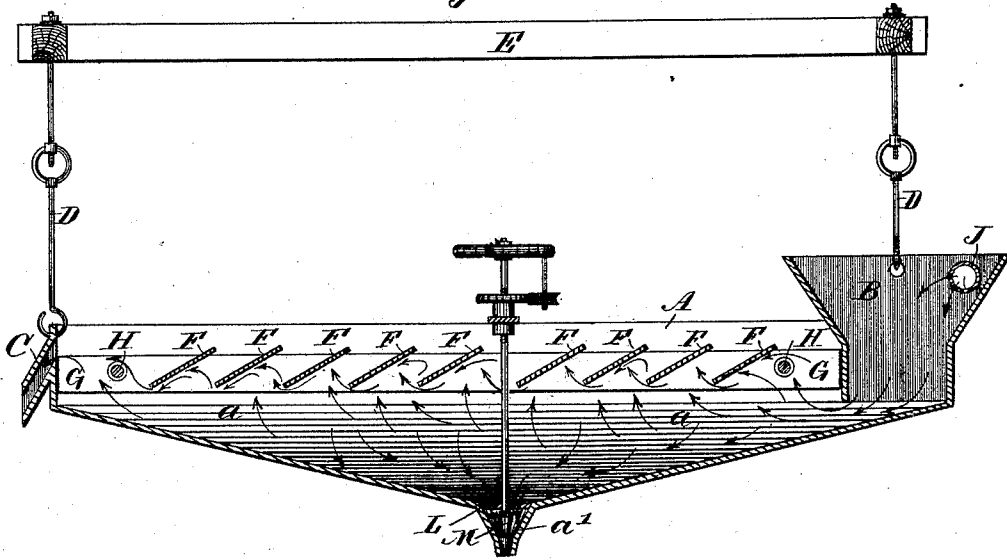
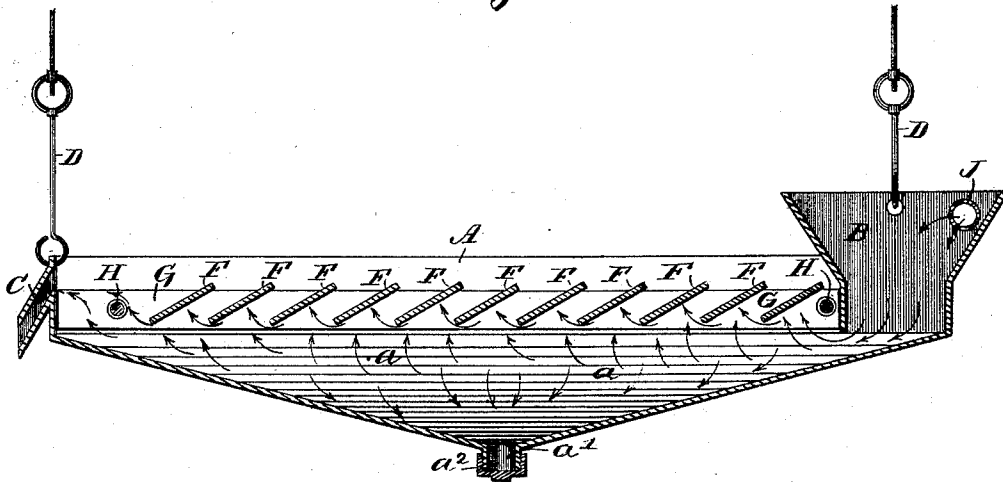


Fig. 6.



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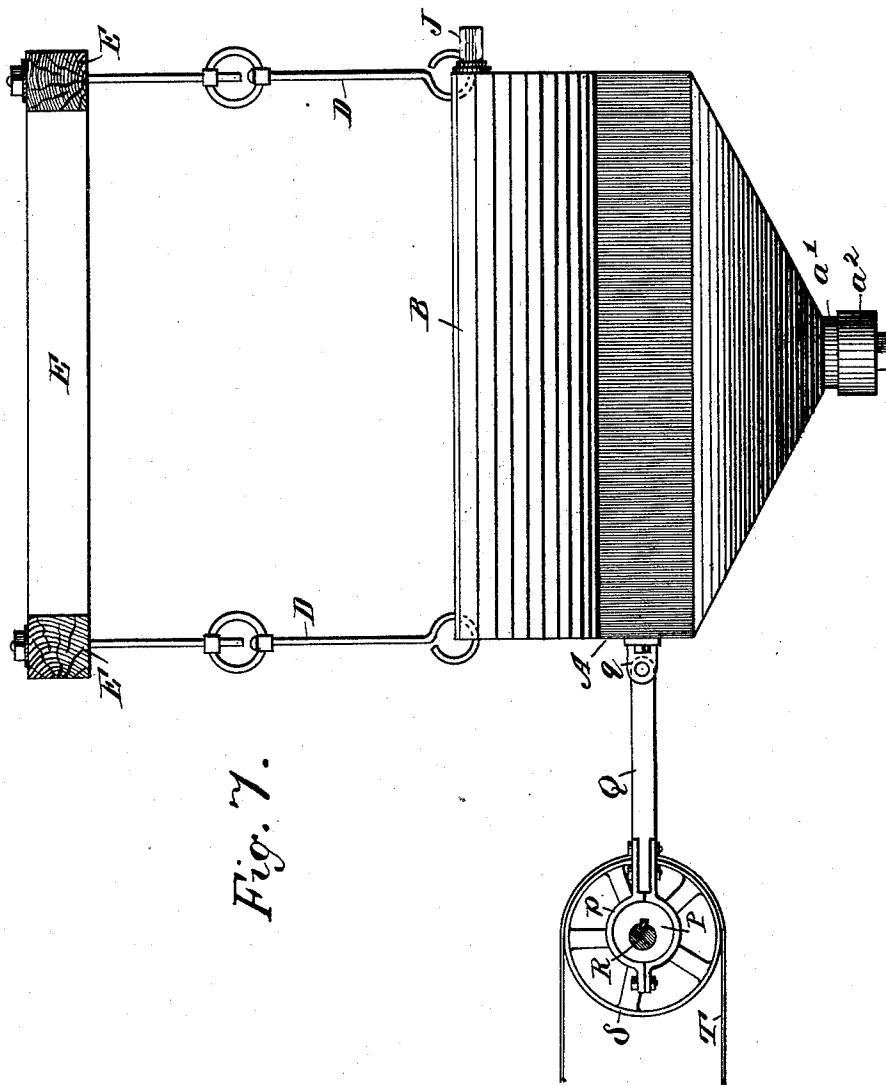


Fig. 7.

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CALVIN M. FITCH, OF CHICAGO, ILLINOIS.

ORE-CONCENTRATING AND GOLD-SAVING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 524,586, dated August 14, 1894.

Application filed February 5, 1892. Renewed April 23, 1894. Serial No. 508,717. (No model.)

To all whom it may concern:

Be it known that I, CALVIN M. FITCH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Ore-Concentrating and Gold-Saving Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

The invention relates generally to apparatus for the treatment of pulverized ore from stamp-mills, or other pulverizing devices, or of gold-bearing-earth or sands; but more particularly to improvements in apparatus for the manipulation of auriferous pulp, tailings, earths or sands carrying a percentage of fine metal which, owing to its peculiar mechanical or physical condition, is so easily acted upon by a current of water as to prevent its ready subsidence, and rendering the saving of the same difficult or impossible by the ordinary methods of treatment; its object being to economically effect the total or substantially complete saving of the most minute particles of gold contained in the material to be treated.

To this end the invention embraces a concentrator consisting of one or more trays or pans so sustained that it may be vibrated or otherwise given such motion as will keep the material under treatment in a constant and thorough state of agitation, or the particles thereof in rapid movement or change of position, and each tray or pan being provided, within its working area, with a series of adjacently arranged, inclined and depending amalgamated plates, or the like, hereinafter referred to as "amalgamated-collectors," so disposed between the points of feed or supply, and waste discharge with reference to the line of travel of the material to be treated and the plane of the waste discharge thereof, that the fine or so-called "float-gold" must necessarily be brought in contact with said collectors before reaching the point of waste-discharge, and therefore be saved.

The amalgamated-collectors, amalgamated upon the whole or a portion of their surfaces, and inclined upwardly and downwardly, or in either direction, as may be preferred, in the direction of a perpendicular to the sub-

stantially horizontal operative plane of the concentrator or the line upon which the material treated passes to discharge, all disposed transverse the tray or pan within the area occupied by the mass under treatment and athwart the direction of travel thereof, and are arranged, a part of the series to extend by their upper portions above the upper surface of the pulp, &c., and the remainder of the series upon, or somewhat below said plane; or the entire series may extend above, or to, or about said surface; all of which is hereinafter fully set forth.

In the accompanying drawings, for the purpose of comprehensively illustrating a simple and effective form of apparatus embodying my said improvements, economical both in construction and operation, I have shown a reciprocating, or vibratorially sustained tray, in form and general operative arrangement substantially similar to my concentrating apparatus, for which Letters Patent of the United States No. 450,063 were granted to me April 7, 1891.

To describe the several views:—Figure 1 is a central longitudinal-section of a tray provided with feed-hopper; waste-discharge; concentrates-outlet; water-feed cylinder; and a series of transversely arranged alternately oppositely-inclined amalgamated collectors, certain of which extend to about the plane of waste-discharge, and the remainder above said plane; the arrangement shown being particularly intended for treating pulp, tailings, earths or sands carrying fine or float-gold, which in virtue of its peculiar physical condition can be but imperfectly saved upon the ordinarily employed amalgamated plates, or by the concentrators in common use. Fig. 2 is a broken detail in elevation, of two of the amalgamated collectors, and the frame which sustains the same within the tray; the view being as from the waste-discharge end of the apparatus. Fig. 3 is a broken detail in side elevation of the frame which sustains the collectors; the view being intended to show the manner in which the collectors are removably held in position. Fig. 4 is a broken detail in rear elevation of one of the amalgamated collectors; intended to show the form of its end, which is held by the frame. Fig. 5 is a central longitudinal-section of a tray pro-

vided with a series of transversely arranged amalgamated collectors; all inclined in a similar direction, and extended above the plane of waste discharge; the tray being also provided, as shown in the Letters Patent above referred to, with an inverted cone-shaped concentrates outlet in its bottom, a perforated diaphragm covering the same, and a valve corresponding with said outlet, for controlling the discharge of the concentrates; the arrangement shown being more particularly intended for the treatment of pulp, &c., carrying a percentage of metallic particles heavy enough for concentration in the bottom, and to likewise coincidentally save the float-gold. Fig. 6 is also a central longitudinal-section of a tray provided with a series of transversely-disposed amalgamated collectors, the entire series being inclined in a similar direction, and being upwardly extended above the plane of waste-discharge; said arrangement being intended for the treatment of material wherein the values consist mainly or entirely of fine or float-gold. Fig. 7 is an end elevation of the concentrator, and means for giving vibratory motion thereto.

Like letters refer to similar parts throughout the several views.

A indicates the main body of the apparatus; *a* the inner or working-area thereof; *a'* the concentrates outlet; B the feed-hopper; C the waste-discharge; D means for sustaining the apparatus so that it may be vibrated; E a frame to which the sustaining devices are attached; and J a water-feed cylinder located within the hopper, connected with a source of water supply (not shown).

P refers to an eccentric carried by a shaft R driven by a belt-pulley S and belt T; the eccentric being operatively connected with the concentrator by means of the connecting-rod Q attached to the strap P.

In Fig. 1 F, F' refer to the amalgamated collectors, preferably in the form of rectangular plates, removably sustained in position by the frame G, (one-half of said frame being deemed sufficient for showing the same in the several views,) held together by transverse bolts or rods H; the plates F being inclined upwardly in the direction of the leading or feed-end of the apparatus, and extended above the plane of waste-discharge, indicated by the horizontal arrows pointed in the direction of the waste-discharge; and the plates F' being inclined in a direction contrary to the inclination of plates F and extended upwardly only to, or about the said plane of waste-discharge.

The plates F are amalgamated on their lower surfaces, and the plates F' are amalgamated on their upper surfaces, but if desired the entire surface of each plate may be amalgamated.

The outlet *a'* shown in the bottom of the apparatus, is provided with a removable cap *a''*; and the lower inner area of the apparatus is ordinarily supplied with a suitable quantity

of mercury, not considered necessary to be shown herewith.

The frame G is provided with simple grooves *g*, within which the ends of the collectors rest, and from which they may be easily withdrawn, when desired, for removing the amalgam.

As the material to be treated passes through the working area of the apparatus from the point of supply, the particles of precious metal continuously changing position through the mass, consequent upon suitable motion given to the apparatus must pass over and under the amalgamated surfaces, respectively, of all or a number of the collectors, before reaching the point of discharge, as indicated by the upward and upper downwardly-inclined arrows or must be taken up thereby. It is therefore apparent that the substantial, if not complete, saving of the fine or float-gold must thus be effected.

Should the material being acted upon, carry particles of gold in such physical condition that it works downward through the mass, the same will be collected as concentrates, or taken up by the mercury which may have been placed within the apparatus; the removal of the cap *a''* permitting the withdrawal of the mercury whenever expedient or desirable.

In Fig. 5 the collectors F, held by the frame G, are all inclined upwardly in the direction of the leading or feed-end of the apparatus; extend above the plane of discharge; and are amalgamated on their under surfaces, but if desired may be amalgamated over their entire surfaces.

As the material to be acted upon passes from the point of supply through the working area of the apparatus, on its way to the point of discharge, the fine or float-gold working through the labyrinth of collectors must obviously be brought more or less completely in contact with the amalgamated surfaces thereof, as indicated by the upward and upper downwardly-inclined arrows, while the coarser particles are carried downward and collected as a concentrate.

In Fig. 6 the arrangement of the amalgamated collectors is similar to the manner of arrangement of the like devices shown in Fig. 5; the bottom of the apparatus being more particularly intended to carry a supply of mercury, as mentioned in connection with the apparatus illustrated in Fig. 5.

I am aware that amalgamated plates have heretofore been used in apparatus for the treatment of the precious metals, and I therefore do not claim the same as my invention; but the employment of devices of such character in the operative arrangement set forth in machines to which motion is essentially given to bring about constant change of position of the particles of the mass under treatment, insuring the bringing of a much greater percentage of the fine particles of metal in contact with the amalgamated surfaces of the

plates, than can be ordinarily effected by the current induced by the water employed in the process of treatment, is novel and of great utility.

5 I therefore claim as my invention and desire to secure by Letters Patent—

1. The combination of a reciprocating tank having an elevated feed and discharge and a series of transverse amalgamated plates arranged in the general plane of the normal liquid level, between said feed and discharge, and presenting oblique surfaces interrupting the advance of the float-gold between the feed and discharge, substantially as described.

15 2. An ore-concentrating and gold-saving apparatus, arranged and adapted to be given a rapid to-and-fro motion, whereby the mass under treatment is kept in a state of agitation and provided with a series of upwardly inclined amalgamated plates, bars, rods or the like, sloping alternately toward and from the point of supply, disposed, within the up-

per portion of the area thereof intermediate of the points of supply and waste discharge, transversely or otherwise athwart the direction in which the waste from the material under treatment passes to discharge; the plates, bars, &c., having an inclination in one direction being arranged and adapted to operatively extend upwardly from below the upper surface of material being treated to or about the plane of waste-discharge, and the alternate plates, bars, &c., having an inclination in a contrary direction, being arranged and adapted to extend upwardly from below the upper surface of material being treated for a suitable distance above the plane of waste-discharge; substantially as and for the purpose described.

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