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Patented Mar. 28, 1899.

G. W. WILLIAMS.
AMALGAMATOR.

(Application filed Mar. 28, 1898.)

(No Model.)

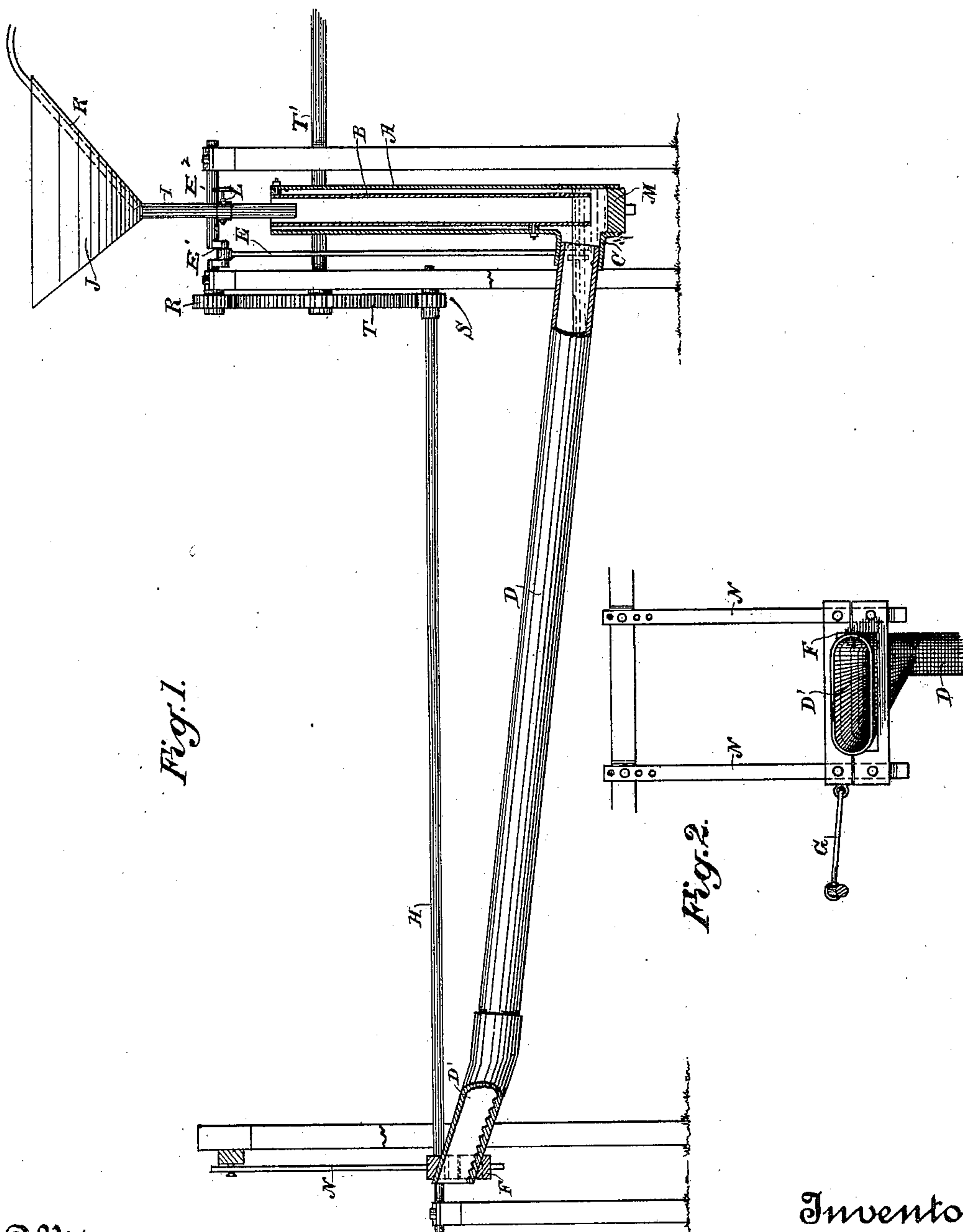


Fig. 1.

Fig. 2.

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AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 621,985, dated March 28, 1899.

Application filed March 28, 1898. Serial No. 675,384. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. WILLIAMS, a citizen of the United States, residing at Payette, county of Canyon, State of Idaho, have
5 invented an Improvement in Amalgamators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an improved apparatus which is especially designed for the
10 amalgamation of precious metals.

It consists in the parts and the constructions and combinations of parts hereinafter described and claimed.

Figure 1 is a side elevation of the amalgamator. Fig. 2 is an end view of its discharge
15 end.

The object of this invention is to bring all particles of fine valuable metal, amalgam, or floured quicksilver intimately and continuously in contact with the mercury and to concentrate the particles thus gathered to a point from which they are easily collected. This is effected by the peculiar arrangement of the inclined pipe with its feed and discharge and
20 the connections by which a vertical and horizontal movement of the opposite ends are effected, respectively, with a resultant rolling movement of the intermediate portion.

As shown in the drawings, the pipe D is
30 supported by a rod or strap E from the crank E' of a shaft E², to which a rotary motion is given, so that this end of the pipe will be moved up and down vertically at such a rate of speed as may be desired. This is the inlet end of the pipe. The discharge end, which
35 is higher, so that the pipe stands at an incline, is suspended in a frame or support F, pivotally connected with any suitable form of framework by means of vertically-adjustable straps N, and this discharge end is caused
40 to oscillate horizontally by means of a connecting-rod G, uniting the support or pipe with the crank-shaft H, to which a rotary motion is applied, as will be hereinafter described.
45

At the receiving end the pipe D is fitted into a T or other coupling C. From this coupling extends a vertical pipe A, having an interior feed-pipe B of smaller diameter fixed in
50 the pipe A, as shown.

The object of the pipe B inside of the pipe A is to allow the use of a smaller amount of quicksilver than the larger pipe would require. It also insures the contact of every particle which is forced down through the pipe
55 B with the mercury contained in the chamber at the bottom. At the upper open end of this a pipe I leads from the hopper or tank J, containing the material which is to be acted upon. Within this tank is the pulp or sand,
60 with such water as may be needed, and a spray-pipe K discharges within it, so as to keep the sand from packing.

By means of a gate or valve at L the feed
65 into the apparatus is regulated.

The lower portion of the T C has fitted to it a plug M, which may be removed whenever it is desired to clean up. When in action, this plug or gate is closed and sufficient mercury is placed in the pipe for the purpose designed.
70 The receiving or feed end of the pipe is, as before stated, suspended from the crank-shaft E, and the rotation of this shaft causes a vertical action, which produces a churning motion in the feed-pipe, and this brings every particle of sand, fine gold, or floured quicksilver
75 into contact with the body of the quicksilver in the apparatus. The opposite or discharge end of the pipe D terminates in an upward curve or incline somewhat steeper than the
80 inclination of the main body of the pipe, as shown at D'. This discharge portion of the pipe is made divergent, so as to have approximately about twice the capacity of the pipe proper, the upward bend being at a greater
85 angle than the main incline of the pipe.

The object of enlarging the exit end of the pipe D is to give the sand or pulp a slower motion as it passes out of the machine, thus giving more time for any valuable material
90 which may have reached this point to settle to the bottom and causing it to thence pass down the steep incline toward the feed end of the pipe, where it would join the main body of the quicksilver, and the sharp incline upward prevents any particles of floured quicksilver escaping.
95

The lower interior portion of the discharge end D' is corrugated or provided with ribs for the purpose of stopping any floured quicksil-
100

ver or fine particles which may have been carried along in the lower side of the pipe by the movement of the sand and material therein. This discharge end of the pipe is, as before
5 described, suspended by vertically-adjustable straps N, by which it may be raised and depressed to increase or diminish the angle of the pipe.

The crank-shaft H is driven directly from
10 the main line-shaft, suitably journaled with relation to the mechanism and having fixed upon it a pinion S, which meshes with and is driven by a gear-wheel T. The crank-shaft E², by which the vertical motion is applied to
15 the receiving or feed end of the pipe, also has a pinion R fixed upon it, which is driven from the same gear-wheel. These pinions are so proportioned to the gear-wheel that the discharge end of the pipe may be run at approxi-
20 mately three hundred and fifty oscillations per minute and the feed end at about two hundred and fifty; but I do not desire to confine myself to these particular proportions, because they may be varied to suit different
25 conditions.

The shaft T', which carries the main gear-wheel T, is driven directly from an engine, water-wheel, or motor of any convenient or available description through which power
30 can be transmitted to operate the apparatus.

The operation will be as follows: The vertical oscillations of the receiving end of the pipe, in conjunction with the means for introducing the material into it, cause a rapid churning motion and at the same time constantly
35 throw the material upward and throw it back into the bottom of the pipe, where it is brought into contact with the mercury contained therein. The discharge end of the pipe
40 moving transversely acts as a sort of settler, which causes the heavy particles to eventually settle to the bottom and collect, so that any floured particles of quicksilver will be brought together and gradually work their
45 way down the grade of the pipe to the feed end, where they will unite with the main body of the quicksilver. The opposite motions of the ends of the pipe produce a rolling motion of the central portion, which throws the contents over and around the inside of the pipe
50 while they are passing through this portion of it, and the constant agitation and the complex motion of the pipe keep the quicksilver bright and free from slime and prevent its becoming dull or coated, or, as it is technically
55 called, "dead." It also scours rusty or coated gold. The agitation and the flow of water through the pipe serve to carry out gravel, sand, and lighter material over the corrugated
60 surface in the enlarged discharge end, any valuable heavy material which has reached this point being arrested by the corrugations.

Whenever the amalgam has become suffi-

ciently charged with gold to make it desirable to clean up, it is only necessary to remove
65 the plug at the lower end of the T C and the apparatus may be cleaned up in the usual or any suitable manner.

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

1. An amalgamating apparatus consisting of an inclined suspended pipe containing mercury, means for giving a vertical motion to one end of said pipe and a simultaneous
75 horizontal motion to the opposite end thereof; means for delivering the material to be acted on into the lower and receiving end of the pipe, said pipe having its discharge end inclined upwardly to a greater degree than the
80 general inclination of the pipe, a vertical feed-pipe connecting with said receiving end, a hopper or tank from which the feed-pipe leads, and a water-pipe discharging into the tank to agitate the contents to prevent pack-
85 ing.

2. An amalgamator consisting of an inclined suspended pipe having a connection whereby a vertical oscillation is given to the lower end, and a feed-pipe and connections to deliver
90 the material to be acted upon into said end of the pipe, a diverging and enlarged discharge end, connections with said discharge end whereby a horizontal oscillatory motion of this end is produced.
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3. An amalgamator consisting of an inclined suspended pipe, mechanism by which an oscillatory vertical motion of the receiving or feed end is produced and a corresponding
100 horizontal motion of the discharge end, an enlarged diverging discharge-mouth, and ribs or corrugations fixed in the bottom of said discharge-mouth.

4. An amalgamating apparatus consisting of an inclined pipe with feed and discharge
105 ends as shown, crank-shafts and rods connecting said shafts respectively with the feed and discharge end in such a manner that a vertical movement of one end and a horizontal movement of the other is produced and an
110 intermediate shaft and gearing whereby the rate of motion of the opposite ends of the pipe can be determined.

5. An amalgamating apparatus consisting of an inclined mercury-containing pipe with
115 feeding devices connecting with the lower end, and mechanism whereby a vertical oscillation of the feed end is effected, and a horizontal oscillation of the discharge end and at different rates of speed.
120

In witness whereof I have hereunto set my hand.

GEORGE W. WILLIAMS.

Witnesses:

A. B. MOSS,

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