C. DUHEM.

Apparatus for Washing and Amalgamating Ores.

No. 211,893. Patented Feb. 4, 1879.

Fig. 1.

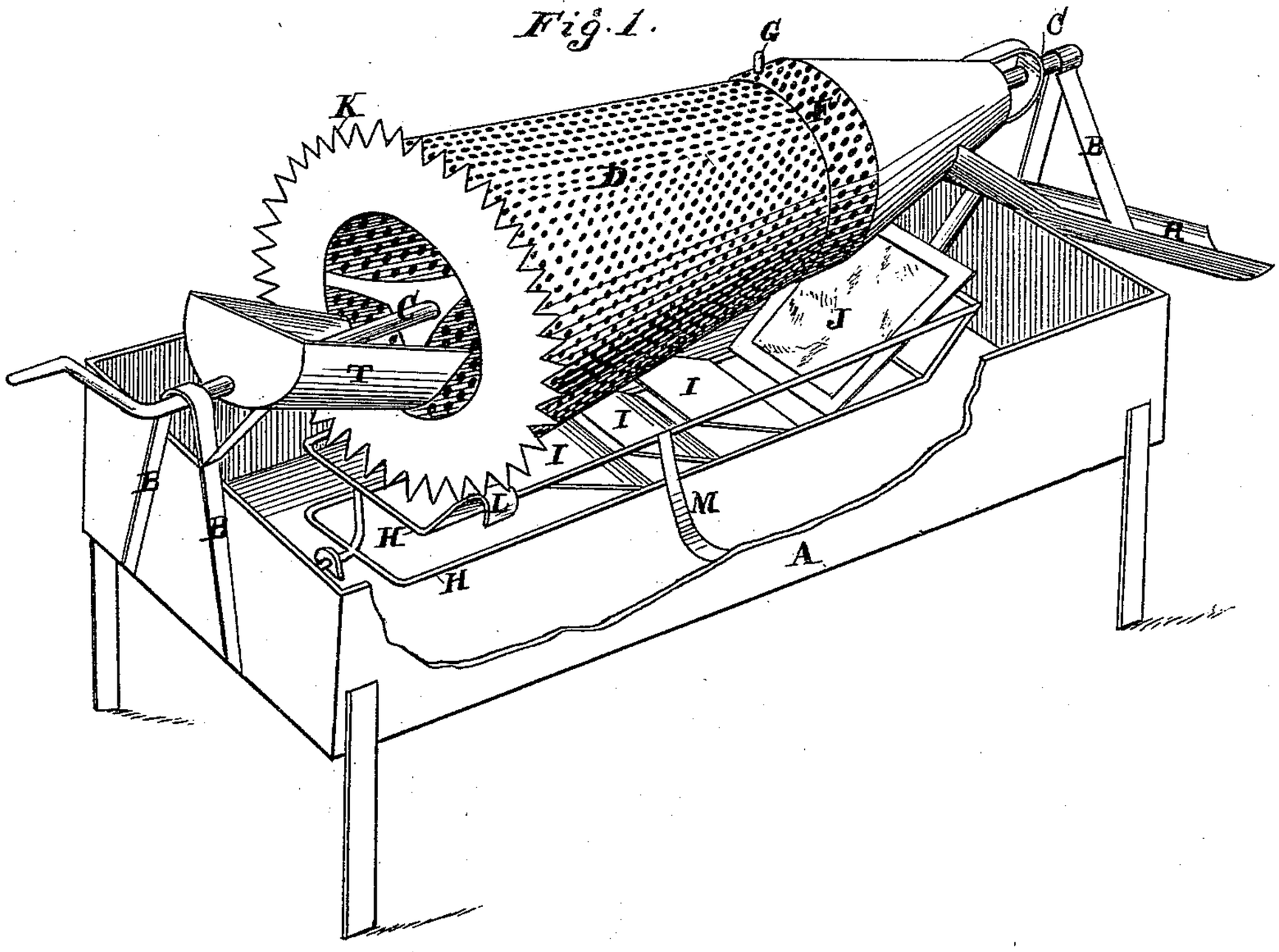
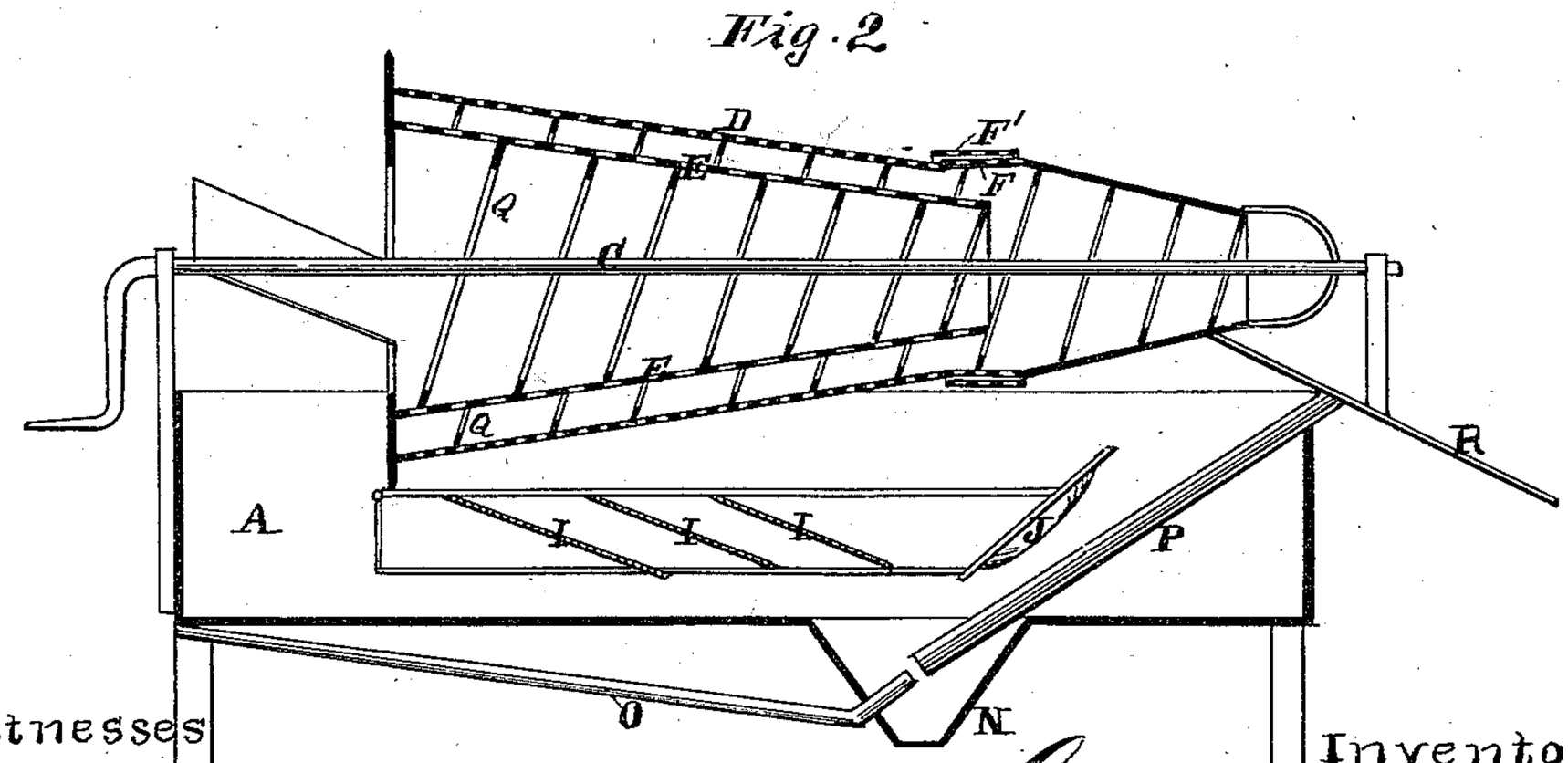


Fig. 2.



Witnesses

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CONSTANT DUHEM, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN APPARATUS FOR WASHING AND AMALGAMATING ORES.

Specification forming part of Letters Patent No. **211,893**, dated February 4, 1879; application filed September 2, 1878.

To all whom it may concern:

Be it known that I, CONSTANT DUHEM, of the city and county of San Francisco, and State of California, have invented an Improved Ore Washer and Amalgamator; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention relates to an improved ore washer and amalgamator; and my improvements consist in mounting above a suitable tank a double perforated conical cylinder, arranged to rotate, and having internal screw-shaped flanges, to carry the material through to the discharge end.

The fine material and precious metals which fall through the perforations of the cylinder drop onto inclined amalgamated plates attached to a cradle in the tank, said cradle being given an oscillating or rocking motion by means of a toothed wheel on the cylinder. There is also a peculiar trap or adjustable screen on the cylinder, designed to catch nuggets, and under it is placed on the rocking cradle a settling-apron, for separating coarse gold from the gravel. The débris or tailings in the tank are discharged by an ejector, which carries them up over the edge of the tank and out of a discharge-pipe.

Referring to the accompanying drawings, Figure 1 is a perspective view. Fig. 2 is a section.

Let A represent a tank mounted on suitable standards, and having an open top, as shown. Longitudinally across the top, on the supports B, extends a shaft, C, on which is properly secured a peculiarly shaped and constructed cylinder, D, arranged to rotate with said shaft. The cylinder is formed in a conical shape, with the smaller end of solid sheet metal and the remainder of perforated metal, as shown. Inside of this is another cylinder, E, of perforated metal, the perforations in which are larger than those in the outside cylinder. This inner cylinder extends from the large end as far as the outer perforated cylinder does, and at the small end an open space is left between the two.

At the point where the perforated and solid plates join each other is a gravel-trap, F. At the junction of the two plates is a band, with comparatively large perforations, and around it fits the sliding collar or strap F′, with corresponding perforations. A lug, G, on the strap F′ serves as a means by which the strap may be moved, so as to make the perforation in the band and strap come opposite each other when desired, so as to allow material to pass through; or the strap may be so turned as to close the openings. By this means the gravel may be carried entirely through the cylinder, or allowed to fall through before reaching the end. A screw-shaped or spiral band or flange, Q, is arranged inside the inner cylinder, and also inside the outer cylinder, for the purpose of carrying the ore from the feed to the discharge end as the cylinder revolves.

By means of the movable strap the size of the openings may be regulated to suit the class of dirt being worked, as the solid parts of the strap may be brought more or less over the holes in the inner band, so as to regulate the size of the passages.

To the bottom of the tank is hinged or pivoted an oscillating cradle, for amalgamating purposes, composed of the frame H, in which copper plates I are placed in an inclined position.

The frame supports also a canvas settling-apron, J, for receiving the coarse material that escapes through the trap in the cylinder, and for separating the coarse gold from the gravel. This cradle is placed longitudinally with and under the cylinder, so as to receive in the inclined plates the auriferous sand as it drops from the revolving screen or cylinder, and is pivoted, as shown, so as to oscillate or have a rocking or cradle motion. This motion is imparted to it by means of a toothed wheel, K, attached to the cylinder, the teeth of which impinge on the lug L in the frame of the cradle as the cylinder is revolved. A spring, M, attached to the cradle-frame and side of tank, brings the cradle into position again as it is pushed aside by the teeth and released, thus keeping it in an upright position and assisting in the oscillating motion.

In the bottom of the tank A is a hopper-shaped depression, N, into which projects from the outside a pipe, O, the inner end of which opens into another upward projecting pipe, P,

both ends of which are open. The pipe O is smaller than the pipe P, so that they form a hydraulic tailing elevator or ejector. This is constructed on the well-known principle of the steam-injector, which is used especially for feeding steam-boilers. In this instance it is used for the purpose of ejecting the refuse or tailings from the bottom of the tank to the spout into which the upper end of the pipe P opens, thus keeping the tank free of tailings. The discharge-pipe P carries the tailings above the surface of the water in the tank and out over the side or end, as shown, through the spout R.

A feed spout or hopper, T, is arranged to open into the larger end of the cylinder, as shown.

The operation of my device is as follows: The material is fed in through the hopper or spout T at the larger end of the cylinder. The tank is filled up with water to a height sufficient to submerge the lower large end of the cylinder, so that that portion of it is under water. The cylinder is revolved by steam, water, or other power, and the material is gradually and continuously fed and discharged. As the cylinder revolves, the fine portion passes through the perforations in the inner cylinder, and is again sifted finer by the perforations in the outer cylinder. The screw-flanges convey the material out at the other end of the cylinder, the finest portion and that with the greatest specific gravity, however, falling into the tanks. As the precious metals are heavy, the gold will be sifted out and will fall on the amalgamated plates and be caught.

As the material passes out of the perforated portions of the cylinder into the solid portion, it passes over the trap herein described. By regulating the size of the openings in the trap, nuggets or lumps of gold may drop through which would not fall through the smaller perforations in the cylinder. Those which do pass through will drop onto the canvas of the settling-apron, and there be caught and saved. The débris which falls into the tank from the cylinder is carried out of the tank by the hydraulic ejector herein described, which takes the débris from the bottom of the tank, and forces it over the edge into the discharge-pipe, whence it may be led away.

This device is more particularly intended for use in localities where water is scarce. The ore is fed to the cylinder dry, and is only wet by immersion with water in the tank as the cylinder is revolved. As the water is constantly changing by the action of the hydraulic ejector, that in the tank does not become too thick and muddy.

A very small quantity of water is sufficient for working ore by this method, as the screens effectually separate the gold from the gravel with which it is mixed when operated, as herein described.

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

1. The perforated concentric cylindro-conoids D and E, the outer one being provided with the sheet-metal cone at the end, and the gravel-trap F, together with the movable perforated band F′, whereby the discharge may be regulated or arrested, substantially as herein described.

2. The oscillating cradle or frame H, with the inclined receiving-plates I, situated within the tank A, in combination with the rotating perforated cylindro-conoids D E, substantially as and for the purpose herein described.

3. The oscillating cradle H, situated within the tank, and extending the whole length of the cylinder, with its inclined receiving-plates I, in combination with the rotating cylindro-conoids and the toothed wheel K upon the shaft C, whereby an oscillating motion is communicated to the cradle by the rotation of the cylinders, substantially as and for the purpose herein described.

4. In combination with the revolving cylinders D and E, as shown, and the oscillating cradle H, the settling-apron J, to receive coarse material from the trap F, substantially as herein described.

5. The tank A, with the hopper-shaped depression N, to receive the pipe O, said pipe opening into the upwardly-extending pipe P, and acting as a tailing-elevator, in combination with the apparatus, substantially as herein described.

In witness whereof I hereunto set my hand.

CONSTANT DUHEM.

Witnesses:

CHAS. G. YALE,

FRANK A. BROOKS.