No. 664,712. Patented Dec. 25, 1900.

A. Z. BALDENEBRO.

GRADING AMALGAMATOR.

(Application filed Sept. 15, 1899.)

(No Model.)

Fig. 1.

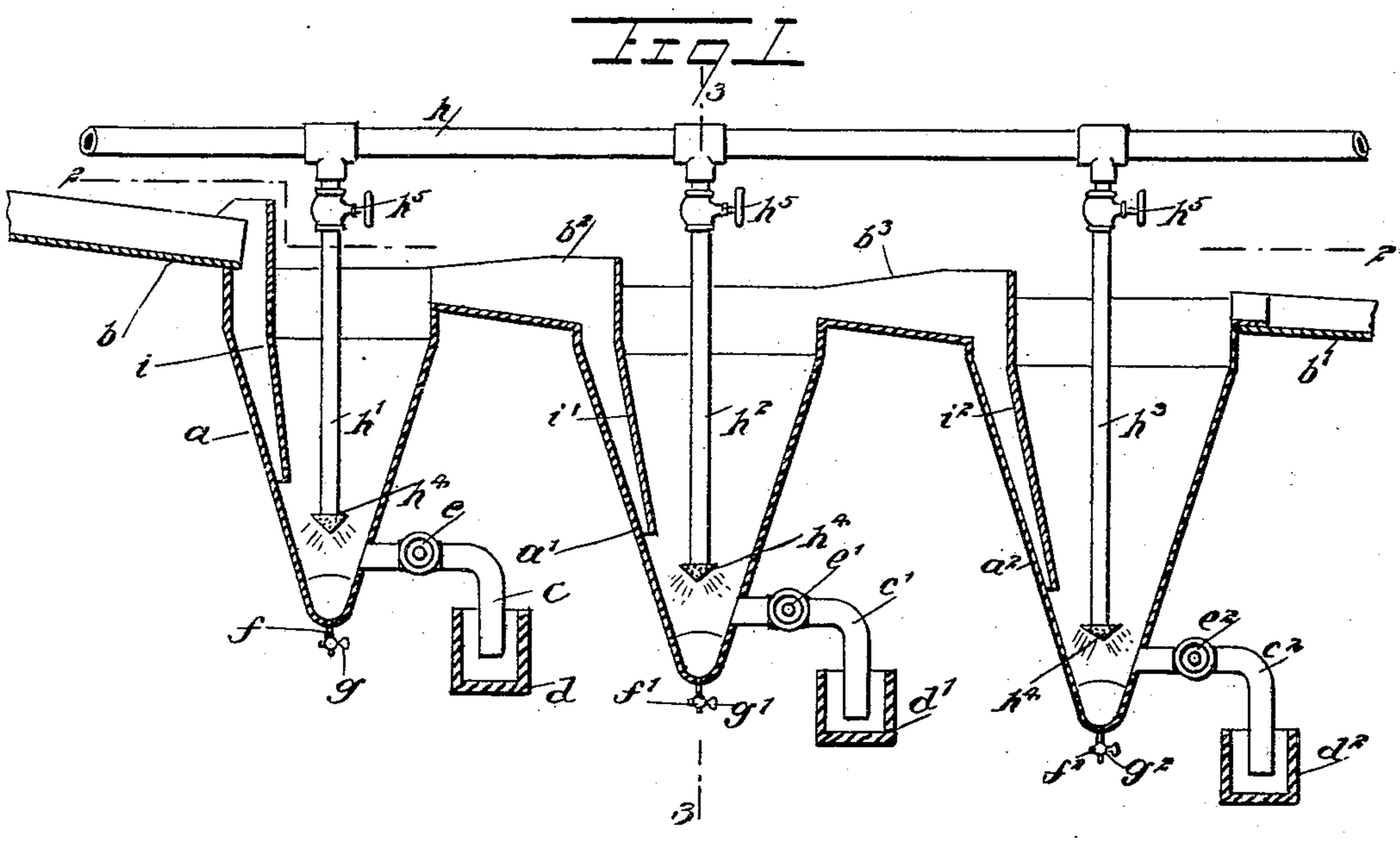


Fig. 2.

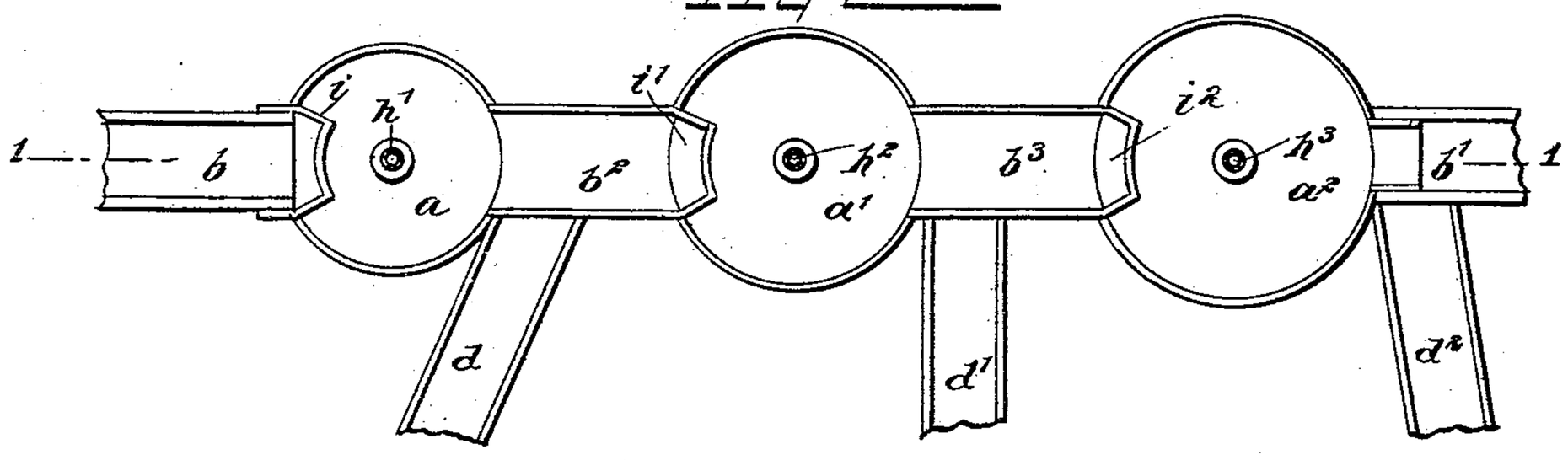
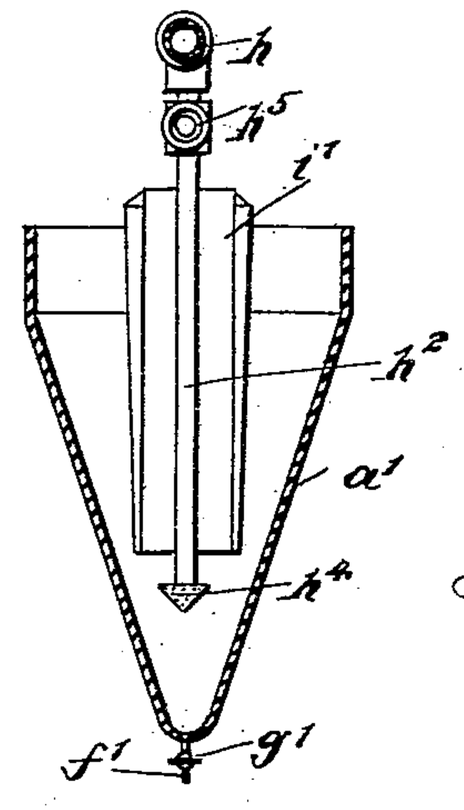


Fig. 3.



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GRADING-AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 664,712, dated December 25, 1900.

Original application filed September 14, 1898, Serial No. 690,941. Divided and this application filed September 15, 1899. Serial No. 730,598. (No model.)

To all whom it may concern:

Be it known that I, ALFONSO ZEVADA BALDENEBRO, of the city of Mexico, in the Republic of Mexico, have invented a new and Improved Grading-Amalgamator, of which the following is a full, clear, and exact description.

My present application is a division of that filed by me on September 14, 1898, Serial No. 690,941.

My invention relates to the treatment of ores containing precious metals, and particularly gold ores, and has for its object to provide an amalgamating apparatus which will be of great efficiency and which will extract the metal from the ores in the nature of several amalgams of different grades obtained by the successive amalgamation of the ore.

The invention will be fully described hereinafter and the features of novelty pointed out in the appended claims.

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 elevation of my improved grading-amalgamator on the line 1 1 in Fig. 2. Fig. 2 is a sectional plan thereof on line 2 2 in Fig. 1, and Fig. 3 is a cross-section on line 3 3 in Fig. 1.

The grading-amalgamator shown in the drawings comprises three conical receptacles a a' a^2, tapering toward the bottom, which may be rounded, as shown. The receptacles are made of any suitable material, such as sheet-iron, and are of different sizes. The smallest receptacle a is located at a higher level than the others and has a wooden feed-channel b, and communication between the receptacles is made by means of sheet-iron channels b^2 b^3. Each of the receptacles is provided at the inlet side with a lateral channel i i' i^2, leading toward the bottom of the receptacle. Near the bottom, preferably at the outlet side, the receptacles are provided with elbow-pipes c c' c^2, controlled by cocks e e' e^2 and leading to wooden channels d d' d^2. Longitudinally above the receptacles extends a water-supply pipe h, with branch pipes h' h^2 h^3, controlled by cocks h^5 and extending axially into the receptacles and provided at the bottom with spraying devices h^4 in the form of perforated cones. These spraying devices are located at a level below the bottom ends of the lateral channels i i' i^2. Finally, the receptacles have bottom outlets f f' f^2, controlled by cocks or valves g g' g^2.

In operation the receptacles are supplied with mercury to a height of about five or six centimeters, the cocks e e' e^2 and g g' g^2 being closed. The cocks h^5 are then opened and the receptacles are filled with water up to the top. Then the pulp is fed through the inlet-channel b and flows down the channel i into the water contained within the receptacle a. In contact with the water the pulp is divided into two portions, the heavier portion consisting of auriferous pyrites or other gold compounds, of free gold, of amalgamated particles coming from the crushers, and of particles of mercury. These heavy constituents, although they may be stirred up and partly carried along by the flowing pulp, fall to the bottom of the receptacle a. The lighter portion of the material consists of the magma or gangue of the ore and of very small particles of gold, pyrites, amalgam, and mercury. This lighter portion passes through the channel b^2 to the second receptacle a', where the same operation as above described is repeated. A third and fourth operation may be added, if desired. When the supply of pulp is stopped, the cocks e e' e^2 are opened, allowing the heavy particles (containing the valuable substances) to escape into the tubes c c' c^2 and into the channels d d' d^2, whence they are conducted to any suitable apparatus for further treatment. The material escaping at the outlet b' is waste, and practically all the amalgam, mercury, and also the "floating" gold is recovered. This is due both to the provision of the mercury at the bottom of the receptacles and to the particular direction given to the current of pulp by the downward channels i i' i^2 and by the conical spray heads or nozzles h^4, which are so located in the path of the current that the jets discharged from the nozzles will cross the main current where it issues from the said channels. When the level of the mercury rises, the cocks g g' g^2 can be opened, so as to maintain a constant level.

The reason for arranging the receptacles

a a' a^2 at different levels and making them of different sizes, as shown, is as follows: My object is to produce a current of pulp of uniform and constant velocity from the first receptacle to the last and also to facilitate the deposit by gravity of the mineral particles at the bottom of each receptacle. Thus the heaviest particles, as described, are to be deposited in the first receptacle, the lightest or finest in the last, and intermediate grades in the intermediate receptacles. In order to obtain this result in a perfect manner, the water contained in the receptacles should be more and more calm as the particles to be deposited become finer—that is, in the first receptacle, where the heaviest particles are deposited, the water should have the strongest motion and less in the succeeding receptacles. To accomplish this, I cause the current of pulp to pass through a gradually-increasing body of water as it travels from one receptacle to the others—that is, the first receptacle being the smallest the water will be most strongly agitated in it, while the other receptacles being progressively larger the bodies of water contained in them will be comparatively calm, and thus allow the finer or lighter particles to become deposited. By tapering the receptacles toward the bottom I cause the pulp to flow upward after its issue from the channels i i' i^2, and I also guide the pulp-current in such a manner that the jets discharged from the nozzles h^4 will cross both the descending and the ascending portion of the pulp-current.

As shown in the drawings, the forward wall of each of the inlet-channels i i' i^2 has a convex inner face concentric with the opposing face of the receptacle forming the rear wall of the channel. By this construction the current flowing down in said channels is given a uniform thickness in its entire width, and therefore the flow will be uniform in the entire cross-section of the channel. If the distance between the forward and rear walls at the center were greater than at the edges, the current would be swifter at the edges than at the center. This is avoided by having the inner and outer walls of the channel parallel.

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

1. A funnel-shaped amalgamating vessel having an inlet at the top, an axially-disposed water-supply pipe located in the said vessel and provided with a spraying device adjacent to the tapered bottom of the receptacle, an interior lateral channel extending downward from said inlet along the inclined wall of the vessel and terminating above the level of the spraying device, the forward wall of said channel having a convex inner face parallel with the opposing concave face of the vessel and a valve-controlled elbow-pipe leading from the side of the receptacle near the bottom thereof, substantially as described.

2. An apparatus for grading ores, comprising a series of funnel-shaped vessels, a water-supply pipe leading into each vessel, and provided with a spraying device adjacent to the tapered bottom of the vessel, overflow-channels connecting the vessels, an interior lateral channel extending downward from the inlet of each vessel along the inclined wall thereof and tapering toward its lower end, the outlet of said channel terminating above the spraying device, the forward wall of said channel having a convex inner face corresponding with the opposing concave inner face of the receptacle forming the rear wall of the channel, a valve-controlled pipe leading from the side of each vessel near the bottom, channels to which the said pipes lead, and a valve-controlled outlet for the bottom of each vessel, substantially as described.

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