

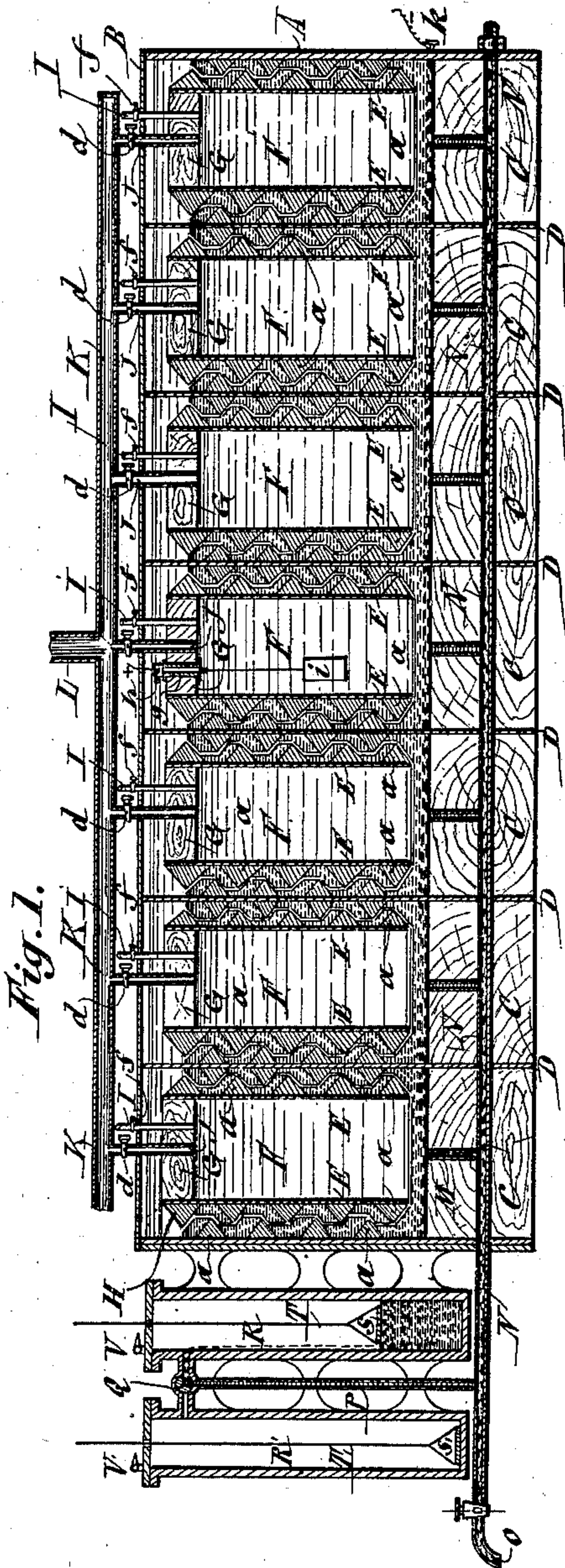
No. 702,179.

Patented June 10, 1902.

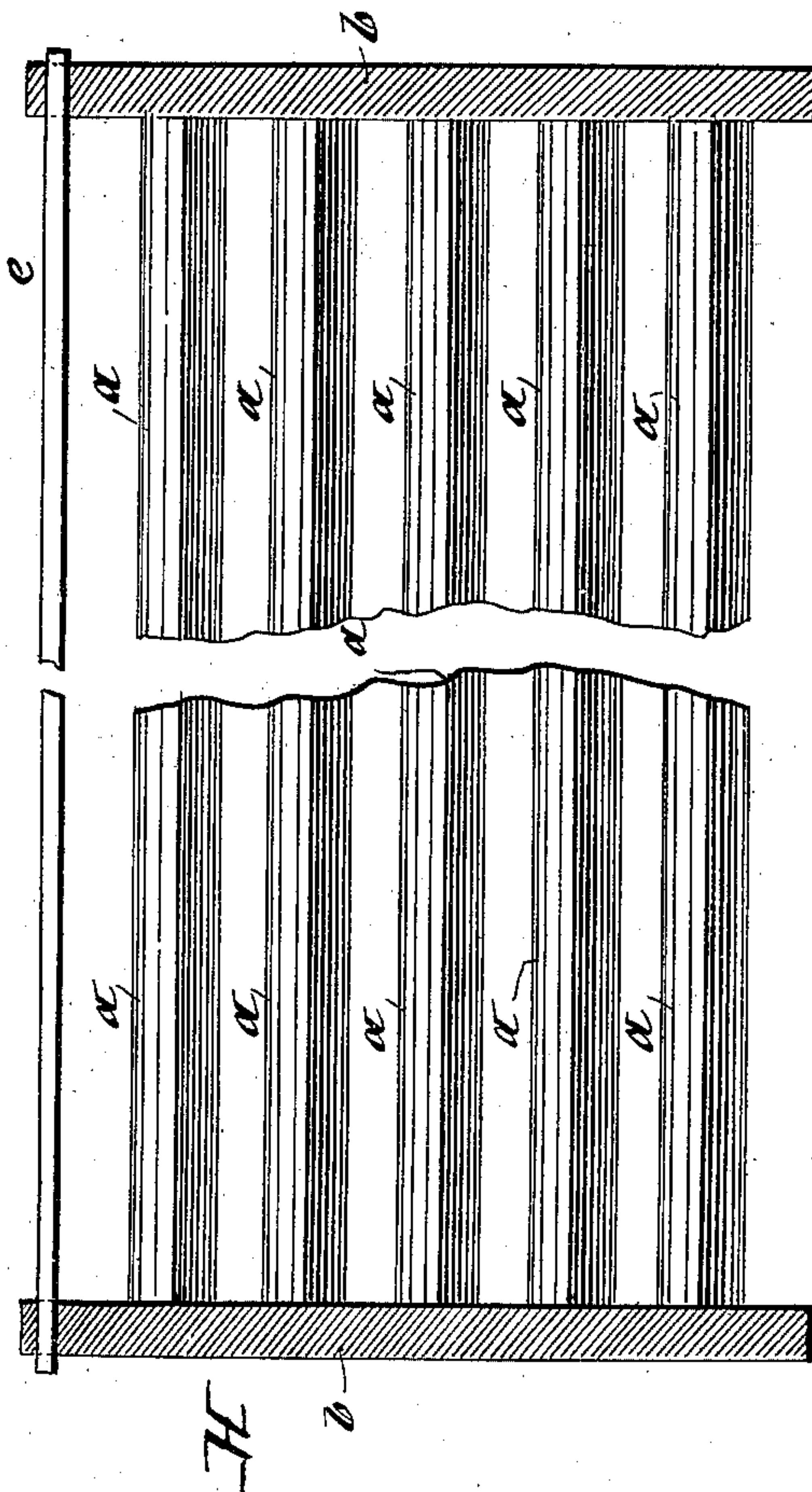
M. BLOUME.  
AMALGAMATING APPARATUS.

(Application filed May 28, 1898.)

(No Model.)



*Fig. 2.*



Witnesses:

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# UNITED STATES PATENT OFFICE.

MARGUERITE BLOUME, OF PARIS, FRANCE.

## AMALGAMATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 702,179, dated June 10, 1902.

Application filed May 28, 1898. Serial No. 682,005. (No model.)

*To all whom it may concern:*

Be it known that I, MARGUERITE BLOUME, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in Amalgamating Apparatus, of which the following is a specification.

The present invention relates to the extraction of gold or other amalgamable metals, the particular object being to provide an amalgamating apparatus which will allow of the total extraction of the metal from the ore by obtaining a perfect contact between the said metal and the mercury.

With the apparatus now employed the principal causes of losses are due to the theft of amalgam, the carrying away of the floating gold, and the defective contact between the ore and mercury. Indeed it is almost impossible to prevent the theft of amalgam with the actual processes of extraction, and the fine gold held in suspension in the water is carried away by the current or remains on the surface or in the interior of the particles of rock which cannot practically be reduced below a certain dimension if we wish to treat the tailings by the cyanid process with success after amalgamation. Moreover, the particles of gold which are covered with a preserving layer of any matter are not in direct contact with the mercury, and consequently, not being amalgamated, are carried away with the current.

With my apparatus the ore rises under pressure suitably crushed, drawn by any mechanical agent—for instance, water—through a column or a sheet of mercury, so as to reduce the column of water carrying the ore to thin strata, and thus secure a perfect contact between the mercury and the ore. Moreover, to secure a still better intimate contact the column of mercury is provided with suitable contrivances intended to oppose the current carrying the ore to make it travel transversely in the mercury to cause the substances carried away to change position constantly, to strike and rub against each other under pressure, also against the obstacles which are placed for this purpose.

My invention does away with all ulterior chemical dressing of the ore, the amalga-

tion absorbing all the metal carried through the mercury.

With my apparatus the amalgamation taking place in a closed receptacle the theft of amalgam is rendered impossible. Moreover, by making thin ascending strata of water pass through the mercury, in which strata the ore is kept in suspension, a perfect contact is obtained between the mercury and the gold, and consequently a complete amalgamation of this latter even when it is covered with foreign matters, which are removed by the rubbing of the particles of ore against the bars of the grates arranged in the mercury-receptacles.

In the annexed drawings, Figure 1 is a broken transverse section of the amalgamator, and Fig. 2 is a broken front view of one of the gratings.

The amalgamator is composed, essentially, of a rectangular tank A, of which the sides are of sheet-iron, while the top, the ends, and the bottom are of strong pieces of wood G and C, separated from one another by vertical sheet-iron partitions D, which divide the tank into several transverse compartments. Each of these main compartments is subdivided into three compartments by the vertical partitions E, which are connected by bolts to the sides of the tank A, but do not rise as high as this latter and leave a free passage between their lower part and the bottom of the tank. The central compartment is closed at its upper part by the piece of wood G and communicates at its lower part with the two lateral compartments, in which the cast-iron gratings H are arranged, the angular bars *a* of which are arranged in such a way as to constitute a narrow vertical zigzag conduit, as shown in Fig. 1. The bars *a* have their extremities connected by the two uprights *b*, which are crossed at their upper part by a rod *c*, which serves as a handle to facilitate the fixing or the removal of the grating, Fig. 2. To increase the action of the gratings, these latter could be covered with a rough and hard body, such as quartz or emery, or they could even be made entirely of emery.

Each cover G of the compartments F is provided with two tubes I J, the first serving for outlet of the air and the second for the introduction of the water. These tubes are re-



spectively provided with cocks *f* and *d*, and the tubes *J* are branched on the common conduit *K*, which through the main pipe *L* receives the water under pressure, in which the ore is suspended. Each compartment, comprising a central compartment *F* and two lateral compartments with gratings, constitutes an element the lower part of which communicates by a tube *M* with a main pipe *N*, closed at one of its extremities and provided with a flowing-cock *O*, as well as a branch *P*, which through a two-way cock *Q* can communicate with the receivers *R R'*, serving as reservoirs for the overflow of mercury. In these reservoirs two floating plates *S S'* are placed, provided with vertical index-rods *T T'*, which pass freely through the covers of the receivers *R R'* and move vertically in front of the hands *V V'*, fixed on the covers. The cover *G* of the central element is traversed by a tube *g*, of porcelain or any other insulating material, through which passes a metallic rod *h*, provided with a screw at its upper extremity and to the lower extremity of which a sheet of lead *i* is suspended, the said piece of lead through the intermediary of the rod *h* and of a conductor being electrically connected with the positive pole of any electric source the negative pole of which communicates with one of the metallic sides of the tank *A* by a conductor secured to this latter by means of a screw *k*.

This apparatus works as follows: The main pipe *L* being previously connected with a suitable forcing-pump, mercury is introduced through one of the tubes *I* in a sufficient quantity to fill the free spaces of the gratings and the bottoms of the elements to a thickness of about one centimeter. The ore, crushed as fine as possible and sifted, is then forced into the apparatus through the pipes *J* with about ten times its weight of water. It follows that under the pressure of this liquid, which soon fills all the compartments *F*, the mercury rises in the gratings *H* and that all the excess falls into one of the receivers *R R'* and flows through the waste-cock until the float *S* or *S'* descends again to the lower part of the corresponding receiver and the zero of the rod *T* or *T'* corresponds with the hand *V* or *V'*. During the filling the tubes *I* remain open to allow the disengaging of the air contained in the apparatus; but as soon as the water ascends to the upper part of these tubes the cocks are closed and the water produces its whole action on the columns of mercury. The water containing the substances to be dressed passing through the tubes is completely emptied through the outlet *O*, and the mercury is filtered to rid it of the gold which it contains, and said mercury is then put back into the apparatus for reuse.

With this apparatus all the joints are made water-tight by means of rubber sheets or other suitable material. Moreover, all the cocks serving for discharging the mercury are provided with any safety contrivances closed

by means of padlocks, with the object of preventing the theft of amalgam. The water carrying away the matters to be dressed instead of getting at the same time into all the elements and passing simultaneously through all the columns of mercury may also be introduced only into the central compartment, where the water is divided into two currents, one of which passes into the columns of mercury of the right element and the other into that of the left element. The carrying away of the matters to be dressed may also be attained by means of compressed air or steam.

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

1. The combination with a tank having sheet-iron sides, of vertical sheet-iron partitions arranged in the tank and dividing the same into a series of main compartments, vertical partitions *E* therein, dividing each main compartment into three compartments—a central compartment and lateral compartments, the bottom of the partitions *E* not reaching the bottom of the compartments whereby to afford communication between the lateral compartments and the central compartment, and each of said central compartments being closed at the top, an air-outlet pipe and a water-inlet pipe for each central compartment and a reservoir for the overflow of mercury in communication with each series of compartments.

2. The combination with a tank having sheet-iron sides, of vertical sheet-iron partitions arranged in the tank and dividing the same into a series of main compartments, vertical partitions dividing each main compartment into three compartments—a central compartment and lateral compartments, the bottom of the partitions *E* not reaching the bottom of the compartments whereby to afford communication between the lateral compartments and the central compartment, and each of said central compartments being closed at the top, an air-outlet pipe and a water-inlet pipe for each central compartment, and a reservoir for the overflow of mercury in communication with each series of compartments, and a grating arranged in each lateral compartment, and each comprising angular bars arranged in staggered relation to each other to form a vertical zigzag fluid-passage.

3. An amalgamator comprising a tank, vertical partitions dividing it into main compartments, partitions subdividing the said compartments into three other compartments communicating at their lower parts, the central compartment of each element being closed at its upper part, an evacuating-tube for the air and an inlet-tube for the substance to be dressed for the said central compartments, a grating in each of the lateral compartments and comprising angular bars arranged in staggered relation to each other to form a vertical zigzag conduit, a reservoir adapted to receive the excess of mercury according to the



production of the amalgam, and tubes placing the central lateral compartments of the main compartments in communication with the reservoir, substantially as and for the purpose set forth.

5 4. The combination with a tank, of vertical partitions arranged in the latter and dividing the same into a series of compartments, each series comprising a central compartment and  
10 lateral compartments communicating with the central compartment, each of the central compartments being closed at the top, an air-

outlet pipe and a water-inlet pipe for each central compartment, a reservoir for the overflow of mercury in communication with each series of compartments, electrical conductors one leading within one of the series of compartments and the other being connected with the tank, and a source of electrical energy in communication with said conductors. 15

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