Aug. 13, 1940. G. C. CRANGLE 2,211,101

AMALGAMATOR

Filed Aug. 20, 1938

Fig. 1

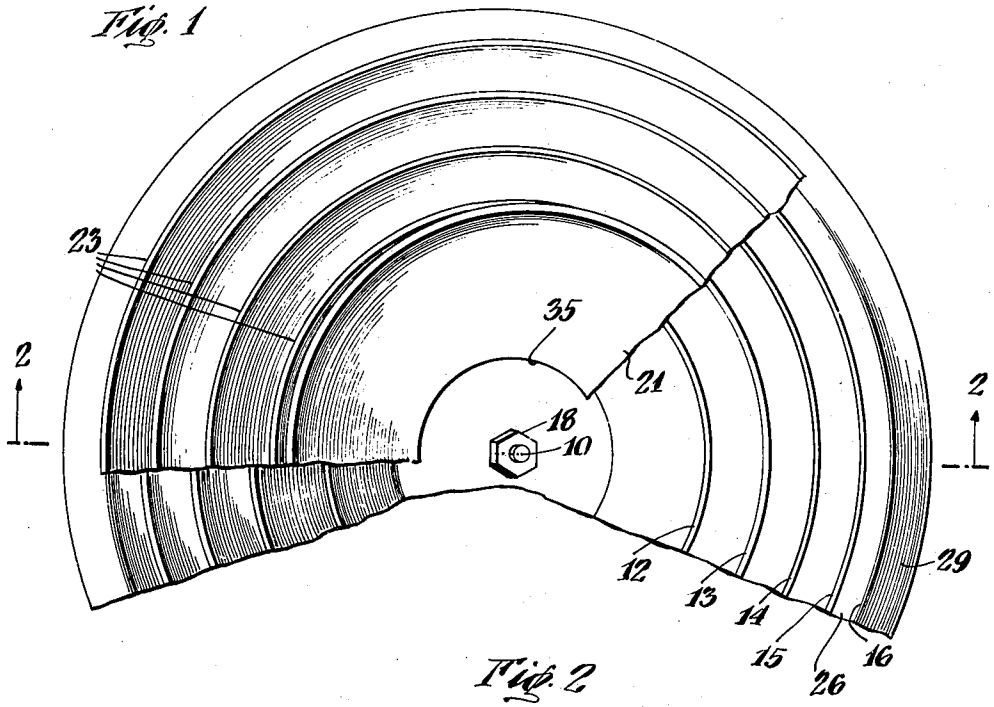
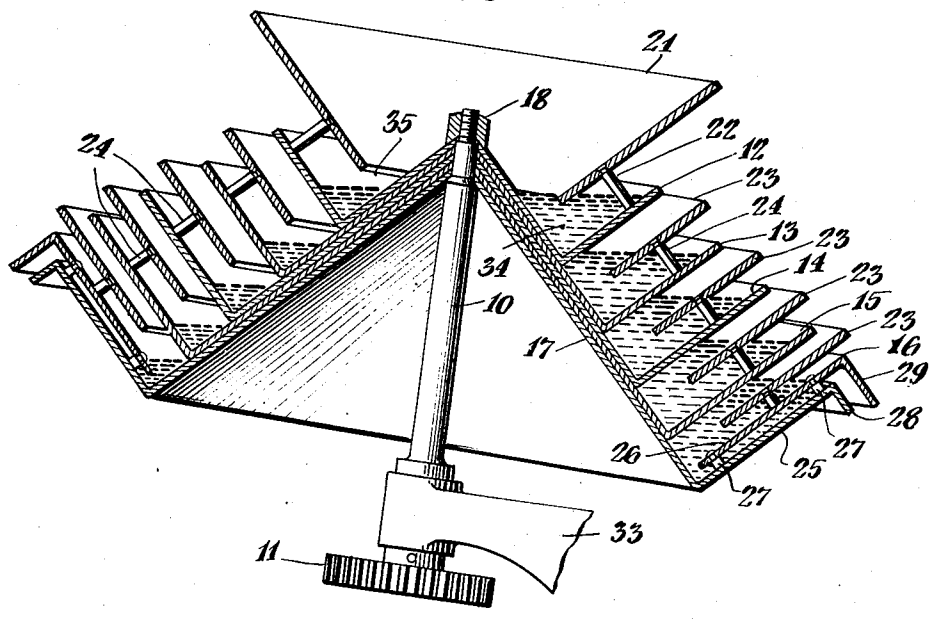


Fig. 2



INVENTOR
George C. Crangle
BY
Cooper, Kerr & Dunham
ATTORNEYS

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AMALGAMATOR

George C. Crangle, San Francisco, Calif.

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3 Claims. (Cl. 209—59)

This invention relates generally to apparatuses for recovering gold from gold bearing material, particularly the material of the kind usually known as pulp. More specifically, the invention relates to amalgamators in which the recovery is made by subjecting the pulp to mercury.

One object of the invention is to provide an amalgamator which is compact and simple in construction and which is at the same time readily accessible for removing amalgamated gold.

Another object of the invention is to provide an amalgamator which is more efficient than devices heretofore known and which will operate with the minimum of attention between the times at which the gold amalgam is removed.

While the amalgamator is relatively small and compact, it is so constructed that the pulp is subject to a large surface of mercury or mercury amalgam as it passes through the apparatus, in addition to which the mercury and the pulp are moved in such a manner as to increase the amalgamating effect.

With the foregoing and incidental objects in view, the invention consists in a novel construction and relation of parts, an embodiment of which is hereinafter described with reference to the drawing accompanying and forming a part of this specification.

In said drawing:

Fig. 1 is a partial top plan view of an amalgamator embodying the principles of the invention with upper portions of some of the parts broken away to expose lower ones to view.

Fig. 2 is a section on the line 2—2 of Fig. 1.

The apparatus comprises a shaft 10 which may be driven in any suitable way as by a pulley drive or by a gear 11 attached to the shaft and meshing with another gear driven by any suitable prime mover.

The invention contemplates a series of successively acting dams 12, 13, 14, 15 and 16. Any number of these dams may be used, but in the drawing five (5) are shown. These dams may be supported in any desired way but, as a matter of convenience, construction and assemblage, they are, with one exception noted later, the rims of copper pans which have their exposed surfaces amalgamated. In Fig. 1 the largest pan 17 is the lowest one and the others are successively imposed upon this larger pan and all of them are then clamped together on the upper end of the shaft 10 by a nut 18 having a conical interior surface coresponding with the shape of the contiguous face of the top one of the pans. As shown in the drawing, the dams or rims of the pans are of gradually increasing depth from the top or shallowest pan to the lowest or deepest pan.

Concentric to the shaft 10 is a hopper 21 which receives the pulp from the source of supply and deposits it within the upper dam 12. The hopper is provided with legs 22 which will support the hopper in position upon the dam 12. Inserted between the dams are baffles 23 of amalgamated material, each of the baffles having a plurality of posts or other supports 24 which rest upon the dams and provide a clearance between the dams and between the edges of the baffle plates and the bottoms of the pans.

The rim 25 of the largest or bottom pan does not serve as a dam, that effect being obtained by a member 26 which is constructed somewhat in the nature of the baffles 23 and has supports 27 resting on the rim of the pan. The rim of the lower pan also has an outwardly extending flange 28 which cooperates with a flange 29 on the member 16 to form an outlet for a purpose hereinafter stated.

The assemblage of parts on the shaft 10 makes what may, for convenience, be referred to as a unitary structure rotating with the shaft when the shaft is driven or turned. The bearing support for the shaft, represented conventionally at 33, is so constructed as to confine the shaft to rotation on an axis which is inclined with respect to a vertical line. As the different parts of the assemblage are concentric to the shaft, this results in the dams and the baffles being rotated in planes which are inclined with reference to horizontal. Behind each of the dams is a supply of mercury which is sufficient to amalgamate gold carried by the pulp and also serve to feed the pulp from one dam to the next lower dam in succession until the pulp is pushed out at the lower part of the assemblage. The height of the mercury is indicated by broken lines 34 behind the dams and, as will be seen, the mercury is nearer the edge or top of each of the dams at the one side (the right-hand side in Fig. 2) than at the other side.

The pulp entering through the hopper 21 will be admitted to the assemblage at what may be termed the lower side of the mercury or high side of the rotating assembled unit; that is to say, above the level of the mercury in the top pan and behind the dam 12. The relation between the lower edge of the hopper and the mercury is such that there is a crescent-shaped opening at 35 which allows the pulp to flow out over the

mercury behind the dam 12 and on the upper face of the dam. The other side of the hopper is submerged in the mercury so that the pulp cannot enter from that side. However, the crescent-shaped opening 35 is always present and the flow of the pulp to the first dam is continuous.

Owing to the inclination of the shaft 10 and corresponding tilting of the dams, the mercury behind the first dam will act upon the pulp to feed it over the edge of the dam and against the upper surface of the baffle 23. The pulp will flow over this baffle and against the mercury and will be allowed to escape from the baffle and into contact with the dam 13 as the unit makes about a half turn; that is, when the flow of the mercury has cleared the lower edge of the baffle, as shown at the left in Fig. 2. This same feeding of the pulp occurs from one dam to the next successive dam until a continuous flow of material is established but with what may be termed an intermittent delivery over the edges of the dams.

It is preferred to have enough mercury back of the rim 25 of the lower or bottom pan to form a seal, as shown at the left of Fig. 2, so that the remaining pulp will be delivered over the upper surface of the member 16. This member 16 is of amalgamated material and will do its part in recovering gold.

The exit between the flanges 28 and 29 is to permit mercury to escape in the event that something abnormal occurs in the operation of the device and beneath the lower point (at the right of Fig. 2) a tray or receptacle of any kind may be stationed to catch any mercury that may be accidentally displaced from the unit.

From the foregoing it is clear that, while the unit is comparatively small and is quite compact in its construction, the pulp is nevertheless subjected to a long path of travel through the apparatus and is worked by the mercury and over the amalgamated surfaces of the unit in such a manner as to give a very efficient contact as well as agitation of the pulp, thereby giving a very high percentage of gold recovery. In addition, owing to the great extent of amalgamated surface to which the pulp is exposed, the apparatus can be operated at comparatively low speed, preferably from 10 to 15 R. P. M. This contributes very materially to operation over a relatively long period of time without any danger of causing flouring of the mercury; that is to say, the apparatus of this application with its great exposure of pulp to mercury is effective at low speeds without deterioration or loss of mercury which occurs with amalgamators operated at high speeds.

While the form of apparatus shown in the drawing and described above is admirably adapted to fulfill the purposes primarily stated, that form may be varied in many ways by changing the construction and relation of parts and it is not the desire to be limited to any extent, except as specified in the claims which follow.

In removing the gold amalgam, the nut 18 may be removed and the parts lifted off in succession to render them accessible, and particularly to make accessible the corners or angles between the bottoms of the pans and the rims of the pans.

The baffles 23, while highly desirable, because of the increased amalgamated surfaces, may be omitted and they may be removed without disassembling the apparatus by shifting them sidewise and then tilting them upward from one side so as to clear the dam above them. The hopper 21 will, of course, first have been removed.

What is claimed is:

1. An amalgamator comprising a rotatable shaft supported at an inclination to vertical, a plurality of rimmed pans stacked and fastened on the shaft with adjoining faces of the pans in contact and each of said pans being of a greater diameter than the one above it, and means for rotating the shaft whereby, because of the inclination of the shaft and pans, pulp is caused to flow over the rim of each pan into the next lower pan at the low sides of the rims.

2. An amalgamator comprising a rotatable shaft supported at an inclination to vertical, a plurality of rimmed pans stacked and fastened on the shaft with adjoining faces of the pans in contact and each of said pans being of a greater diameter than the one above it, baffles concentric to the shaft and between the rims of the pans, and supported out of contact with the bottoms of the pans, and means for slowly rotating the shaft, pans and baffles as a unit and thereby because of the inclination of the shaft, cause the pulp to flow over the low sides of the rims of the pans and over and under the baffle.

3. An amalgamator comprising a shaft supported for rotation at an inclination from vertical, a set of rimmed pans having conical bottoms and stacked together and secured to the shaft with the upper edges of the rims in planes at right angles to the axis of the shaft whereby to hold the pans in a tilted position, baffles between and parallel to the rims of the pans and supported with their lower edges out of contact with the bottoms of the pans, mercury in the pans in sufficient quantity to cover the lower part of the baffles at the low side of the tilted pans and have a clearance between the lower edges of the baffles and the bottoms of the pans at the high side of the tilted pans, and means for rotating the shaft and parts assembled thereon.

GEORGE C. CRANGLE.