

A. B. PAUL.
Amalgamating Quartz-Mill.

No. 213,527.

Patented Mar. 25, 1879.

Fig 1

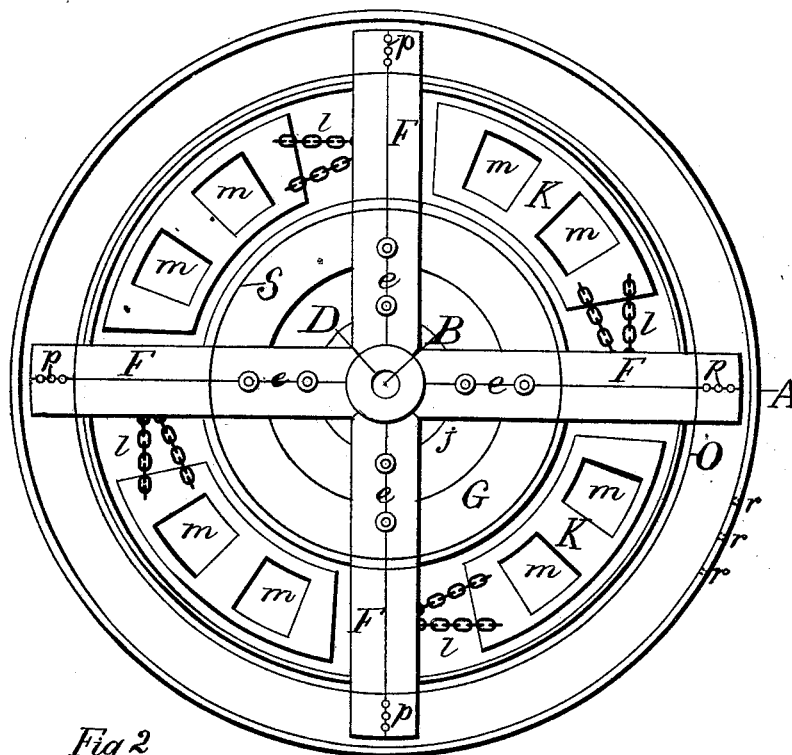


Fig 2

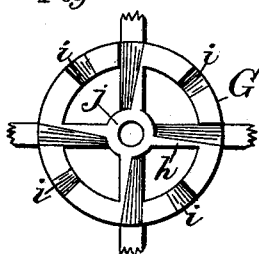


Fig 3

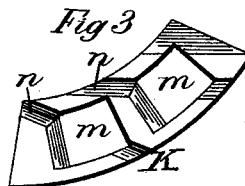
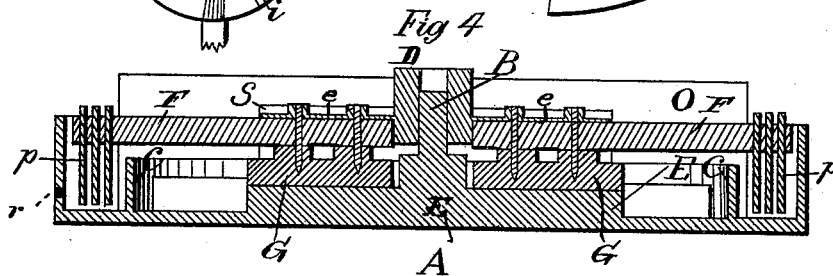


Fig 4



Witnesses

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Inventor

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UNITED STATES PATENT OFFICE.

ALMARIN B. PAUL, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN AMALGAMATING QUARTZ-MILLS.

Specification forming part of Letters Patent No. **213,527**, dated March 25, 1879; application filed July 26, 1878.

To all whom it may concern:

Be it known that I, ALMARIN B. PAUL, of the city and county of San Francisco, in the State of California, have invented a Combination Quartz-Mill; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention has reference to a quartz-mill which combines in a single cheaply-constructed and conveniently-operated machine all the necessary devices and facilities for pulverizing, amalgamating, settling, and concentrating ore pulp.

My present invention is an improvement upon the amalgamator, concentrator, and settler for which Letters Patent No. 193,030 were issued to me on the 10th day of July, 1877; and it consists in increasing its advantages and utility by combining with it a grinding apparatus, and arranging the parts in a more convenient and beneficial manner, all as hereinafter described.

Referring to the accompanying drawings, Figure 1 is a top-plan view. Fig. 2 is a detail view of the muller-ring. Fig. 3 is a detail view of one of the drags. Fig. 4 is a central section of Fig. 1.

Let A represent an iron pan with flat bottom, and having the post or standard B projecting upward from its center. A circular portion, E, of the bottom of the pan surrounding the center post is raised slightly above the remaining or outer portion of the bottom, and a circular vertical rim, C, is secured midway between the outer edge of this raised portion B and the outer side of the pan, thus forming two annular tracks, as shown.

The muller-frame is a casting which is composed of a center or tub, D, from which radiate four angle-arms, *e e e e*, the under sides of which are grooved longitudinally. In the present instance they are made in the form of an inverted V. The hub D has a bore in it, which fits down over the center post, B.

To each angle-arm *e*, I secure a wooden bar, F, by means of bolts and nuts, and these bars extend outward to near the outer rim of the pan, so as to serve as arms, for the purpose hereinafter described.

The muller consists of a metallic ring, G,

which has radial arms *h*, connecting it with a center, *j*. This muller is secured to the under side of the arms F, so that the ring will rest upon the outer edge of the raised portion E of the bottom of the pan, while the radial arms *h* connect the ring with the center piece, *j*.

The under side of the ring is formed with notches *i i* at intervals, one side of which is inclined, while the other side is straight, as shown. One side of each arm *h* is also beveled off in the same direction that the sides of the notches are inclined.

A vertical ring, S, is secured above the muller-ring, to prevent splash and overflow of the ore, which is first reduced by a crusher to a suitable fineness, is fed into the center of the pan, together with a sufficient amount of water, when it is ground by the rotating muller, underneath which it must pass before it can drop from the raised portion E of the bottom of the pan into the first annular track. In this track I place as many drags K as there are arms F, one drag being attached to each arm by a chain, *l*, or other device. Each drag is an iron casting of suitable shape, with openings *m* in it for the circulation of the pulp, and provided with grooves *n* on its under side, one side of which is inclined. These drags move between the outer rim of the raised portion E of the pan-bottom and the low vertical rim C, like an arastra. In this track I place mercury, so that as the pulverized material flows from the edge of the raised bottom it will be caught by the drags and ground to a still greater fineness in the presence of mercury, so as to insure the amalgamation of any metallic particles contained in it.

As the material accumulates in this track it will overflow the vertical rim C and pass down inside of a vertical copper band or ring, O, which is attached to the arms F, so as to travel with it in the outer track just outside of the rim C. The material then passes under the copper band and enters the outside track, in which it is concentrated, the heavier portion settling to the bottom, while the lighter portion rises to the top.

The settling operation is assisted by rakes or stirrers *p p*, which are attached to the outer ends of the arms F so as to project down to near the bottom of the track, so that as the arms move around the rakes will gently stir

or agitate the pulp, so that the heavier particles will settle to the bottom.

The outside rim of the pan has a series of holes, *r r r*, made through it at different heights and in different planes, so that by tapping one of the upper holes the lighter or top portion can be drawn off, or by tapping one of the lower holes the heavier and valuable portion can be withdrawn.

I thus provide a simple, cheaply-constructed quartz-mill, in which the ore is subjected to the various steps of mill treatment, and the valuable portions saved without the expense of separate devices for each operation. This mill is especially valuable on account of the low price for which it can be made, and the facility with which it can be transported to out-of-the-way places.

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

1. The pan *A*, with its central raised portion, *E*, and vertical rim *C*, in combination with the mullers *G*, having arms *h* and center piece, *j*, ring *S*, arms *F*, drags *K*, traveling ring *O*, and

rakes or stirrers *p p*, all combined to operate substantially as and for the purpose described.

2. The muller frame or casting consisting of the center piece, *D*, angle-arms *e*, and arms *F*, in combination with the muller-ring *G*, having arms *h* and center piece, *j*, said arms and ring being formed with grooves or recesses, as described, and for the purpose set forth.

3. The muller-ring *G*, having arms *h*, said ring and arms being grooved or recessed upon the under side thereof, in combination with the arms *F*, drags *K*, and stirrers *p*, substantially as and for the purpose specified.

4. The muller-ring *G*, grooved or recessed as described, in combination with the drags *K*, having their under side grooved transversely, and having one side of the groove inclined, substantially as and for the purpose described.

In witness whereof I have hereunto set my hand and seal.

ALMARIN B. PAUL. [L. S.]

Witnesses:

D. B. LAWLER,

W. F. CLARK.