(No Model.) 2 Sheets—Sheet 1.

G. H. MALTER.

GRINDING PAN.

No. 305,700. Patented Sept. 23, 1884.

Fig. 1.

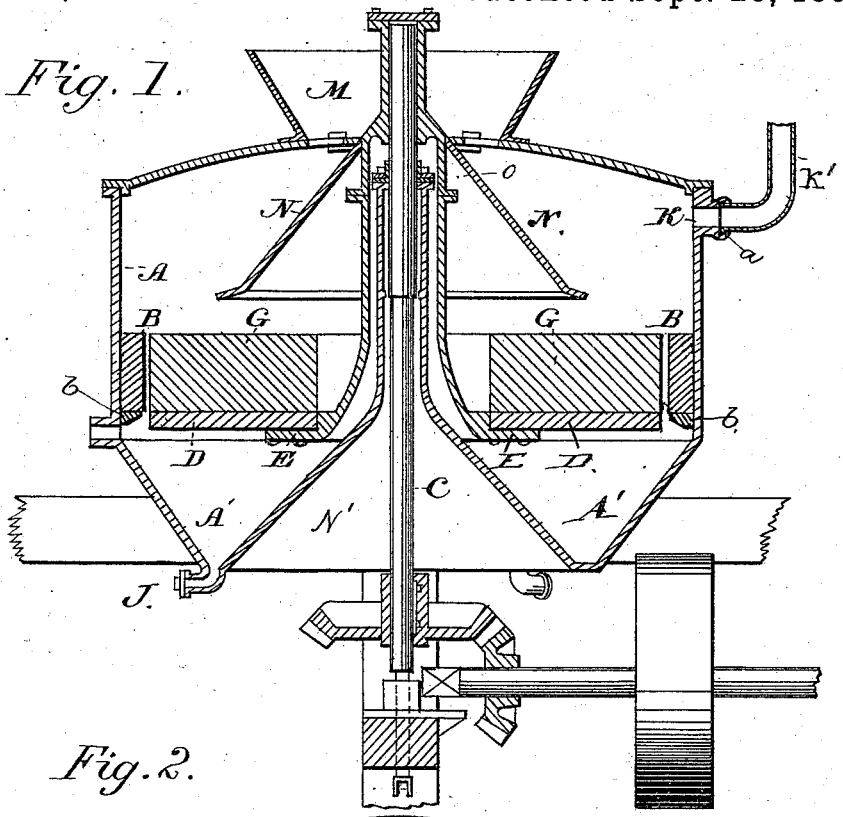
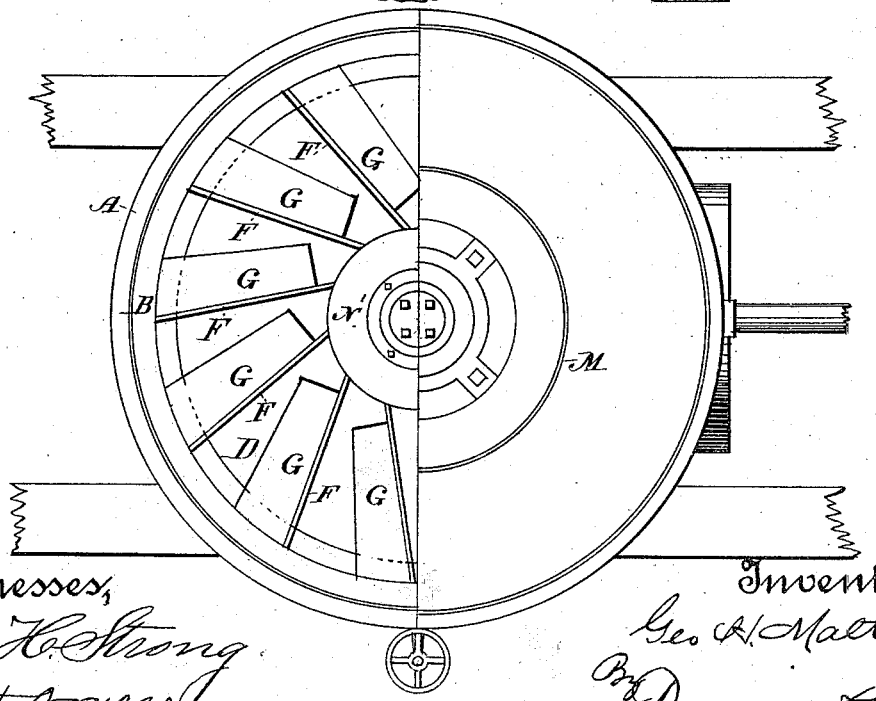


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

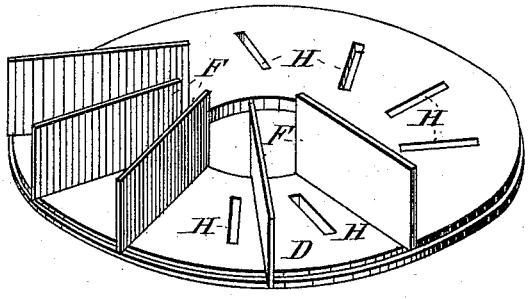


Fig. 4.

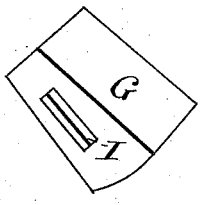
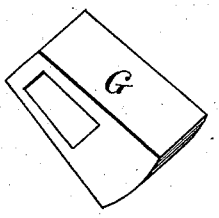


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE H. MALTER, OF SAN FRANCISCO, CALIFORNIA.

GRINDING-PAN.

SPECIFICATION forming part of Letters Patent No. 305,700, dated September 23, 1884.

Application filed October 25, 1883. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. MALTER, of the city and county of San Francisco, and State of California, have invented an Improvement in Grinding-Pans; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to certain improvements in apparatus for pulverizing and reducing valuable rock or ores; and it consists of a pan with vertical sides having a ring or die fixed around its inner periphery, a series of shoes loosely supported upon a muller-plate, which is rotated by a central shaft, and has vertical partitions between which the shoes lie, a feed-hopper, a deflector within the pan, means for supplying water to the pan, and for regulating the discharge. The muller-plate is driven from a central shaft, and has its upper surface subdivided by tangential partitions. The shoes lie within the spaces thus formed, and are thrown outward by centrifugal force, so as to grind the ore-pulp between themselves and the ring-die. The ore is admitted through a hopper at the center of the pan, and delivered upon a deflector to distribute it outwardly toward the circumference of said pan. In dry crushing the ore discharges below, and in wet crushing through an opening near the top of the pan, as will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section through the center of the pan. Fig. 2 is a plan or top view showing part of the cover removed to display the muller-plate. Fig. 3 is a perspective view of the muller plate and some of its diaphragms or partitions. Figs. 4, 5 are views of the shoes.

A is a pan, shown in the present case with straight sides and an annular conical bottom, A′, V-shaped in cross-section below the central cone, N′, and the vertical periphery, and having a heavy ring-die, B, fitted around its inner periphery, as shown, upon a projecting ledge, *b*. The center of the pan has a cone, N′, extending upward, through which the vertical shaft C passes, and the muller plate or ring D is bolted to a flange, E, which depends from a hub or sleeve fitted to the upper end of the shaft C, by which it is driven. The muller D has diaphragms or partitions F standing vertically upon its surface, and extending from near its center to its circumference in planes which are nearly tangential to the central opening. Between these partitions the shoes G are placed. These shoes are of a triangular or tapering shape, of considerable thickness and weight, and have their outer faces curved to correspond with the inner curve of the ring-die. The muller has slots H made in it extending toward the periphery, and the shoes have projections I cast upon their lower surfaces to fit into the slots and act as guides to the shoes in their radial movement. The muller is supported a short distance above the V-shaped bottom of the pan, and when the ore is to be treated in a wet condition water is admitted through a passage, J, below the muller and rises above it, while the pulp passes between the shoes and the ring-die to the ground. The rotation of the muller throws the shoes outward, so as to grind against the ring-die with a force proportioned to the velocity of rotation. The pan has a tight cover, and has a discharge-opening at one side near the top. A curved pipe, K′, extends outward from this opening and has a joint at *a*, which allows the outer end of the pipe to be turned upward from the level of the opening K until it stands vertically with its upper end as much higher than the opening as its length. This enables me to increase the pressure within the pan by elevating the discharge end of the pipe, so that the material must flow up over the top, and the pulp will thus be retained longer within the pan, and may be reduced to a greater fineness.

The ore will be placed in a hopper, M, which surrounds the casing of the vertical shaft above the cover, openings being made through the cover to allow the ore to pass down into the pan where it falls upon cone N, having its widest portion downward, and is deflected outward by it and discharged near the periphery of the pan. This prevents the material from passing down near the center and clogging.

As the pan is closed at the top and has a discharge-pipe which may be elevated above it, it will be seen that the water rising around

the central cone would flow down around the vertical shaft C. In order to prevent this, a packing, O, is fitted around the shaft at the top of the cone.

The edge of the muller may extend beneath the ring-die or rotate in close proximity with it, so as to have a narrow channel between the two, through which the water from the pipe J flows upward as well as between the arms which support the muller. If, however, the ore is to be worked dry, no water would be admitted, and the powdered material would then gradually pass down through the narrow space or channel between the edge of the muller-plate and the bottom of the die and fall into the V-shaped channel, which is formed in the bottom of the pan.

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

1. In combination with a grinding-pan having a ring or die supported upon a projecting ledge formed around the inner periphery of the pan, a muller-plate provided with slots and supported out of contact with the bottom of the pan, a central driving-shaft, and a series of tapering shoes placed upon the top of the muller and provided with projections on their lower faces, the said shoes adapted to be thrown outward into contact with the die by centrifugal action as the muller is revolved, substantially as herein described.

2. A grinding-pan, a muller supported out of contact with the bottom thereof and having partitions and slots upon its upper surface partially tangent to the inner opening, and tapering shoes having projections upon their lower surfaces and adapted to slide between the partitions and to move outward by centrifugal action, in combination with a cylindrical die fitted inside the pan upon a projecting ledge and allowing the pulp to pass between it and the traveling shoes, substantially as herein described.

3. A grinding-pan, a muller provided with slots and supported out of contact with the bottom thereof, a central driving-shaft, shoes provided with projections on their lower surfaces and adapted to slide outward upon the upper surface of the muller, and a circumferential die resting upon a projecting ledge within the pan, in combination with a water-inlet beneath the muller and an outlet at the top of the pan provided with a curved adjustable pipe, substantially as described.

4. In a grinding-pan, a muller-plate supported out of contact with the bottom of the pan and provided with slots and partitions, in combination with shoes having projections on their lower surfaces, substantially as described.

In witness whereof I have hereunto set my hand.

G. H. MALTER.

Witnesses:
S. H. NOURSE,
H. C. LEE.