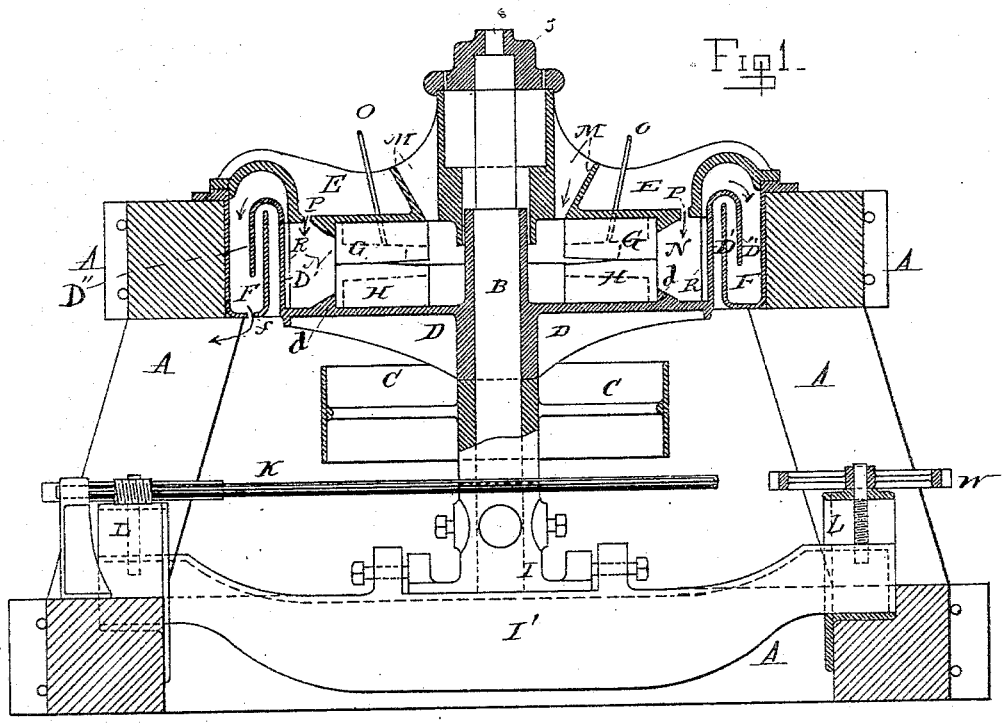
(No Model.) 2 Sheets—Sheet 1.

A. B. PAIGE.

ORE GRINDER.

No. 304,125. Patented Aug. 26, 1884.

Fig 1.



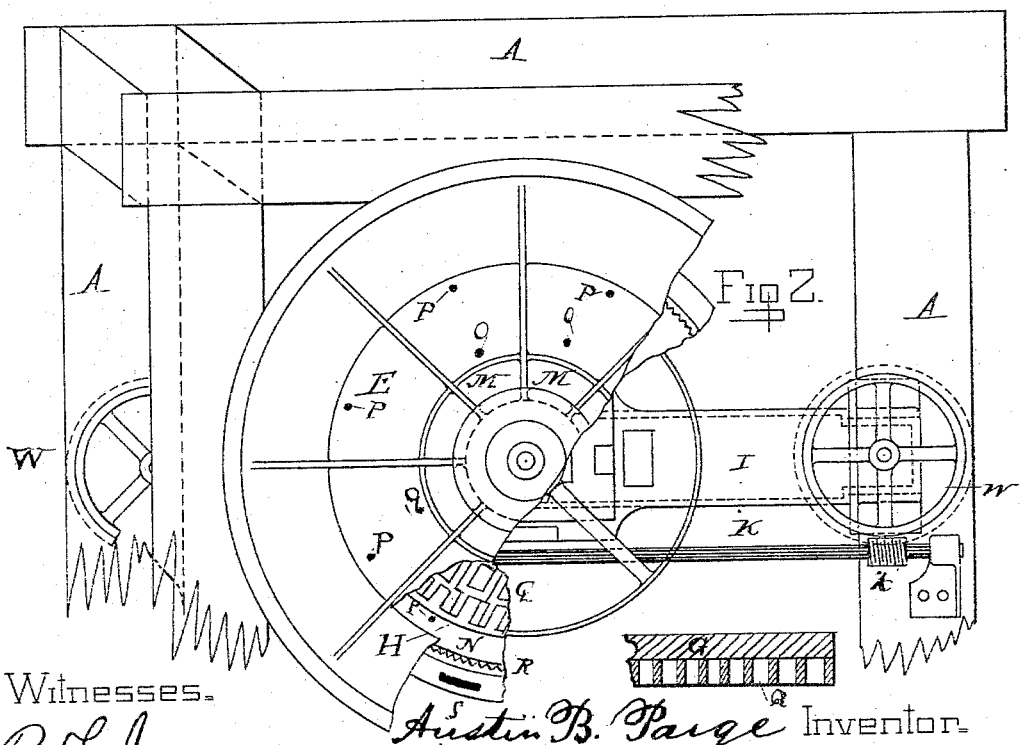


Fig 2.

Witnesses.
B. T. Janney
Isaac T. Gibson

Austin B. Paige Inventor.
By Daniel Breed Atty

(No Model.) 2 Sheets—Sheet 2.

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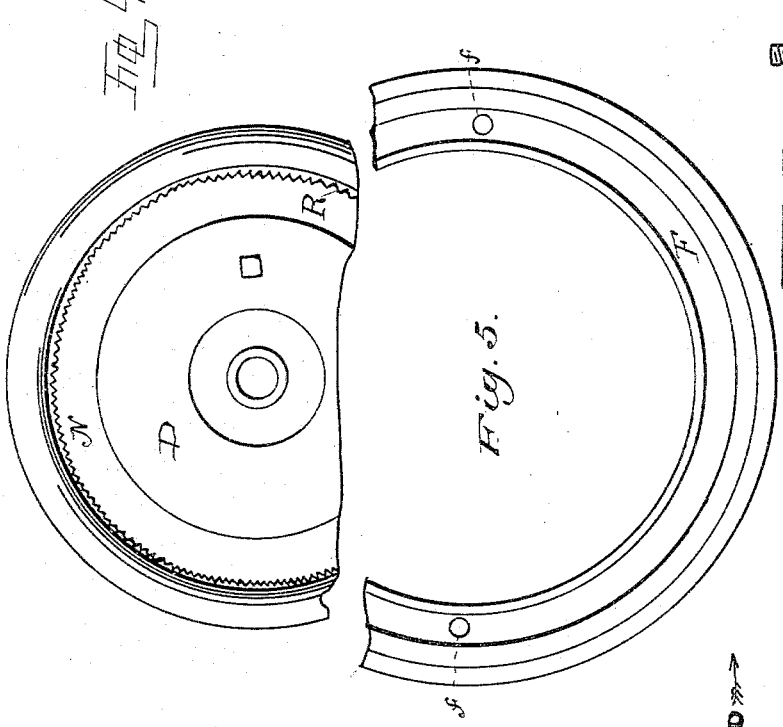

Fig. 5.

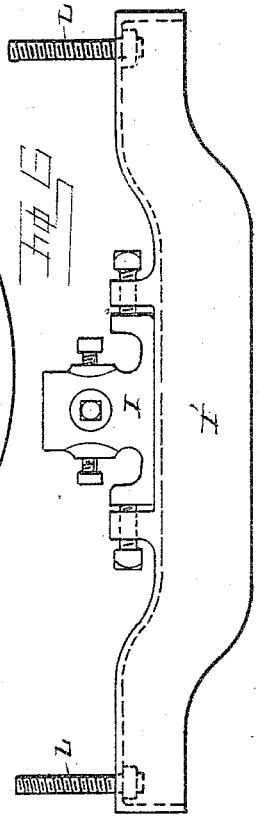

Fig. 4.

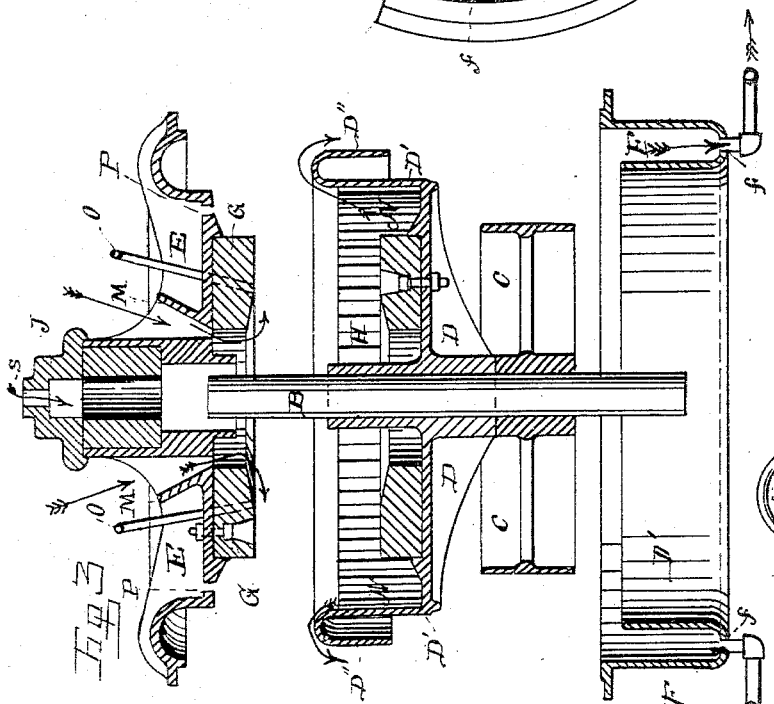

Fig. 3.

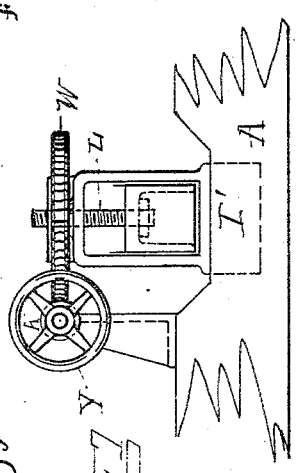

Fig. 1.

Witnesses

Stewart Spalding

Daniel Breed

Inventor

Austin B Paige

UNITED STATES PATENT OFFICE.

AUSTIN B. PAIGE, OF CHICAGO, ILLINOIS.

ORE-GRINDER.

SPECIFICATION forming part of Letters Patent No. 304,125, dated August 26, 1884.

Application filed April 18, 1883. (No model.)

To all whom it may concern:

Be it known that I, AUSTIN B. PAIGE, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Ore-Grinders, of which the following is a specification, reference being had to the accompanying drawings, making a part of this specification.

My invention consists of a novel construction of ore-grinders, which will be fully understood by the following description and claims.

In the accompanying drawings, Figure 1 is a vertical section of my mill. Fig. 2 is a plan view, part of the cover being cut away. Fig. 3 is a vertical section of the mill, the parts being separated a little in order better to show the parts, the cover, hopper, and upper grinding-plate being shown at the top, the shaft, runner, and pulley in the middle, and at the bottom a section of the gutter which surrounds the runner when the mill is put together. Fig. 4 is a plan view of the runner, a portion of the same being broken away. Fig. 5 is a plan view of the gutter. Fig. 6 is a side view of the bridge-tree detached from the mill. Fig. 7 is an end view of the bridge-tree, showing also the cross-shaft with the hand-wheel keyed thereto and the worm-wheels used in raising and lowering the bridge-tree.

Upon a suitable frame, A, Fig. 1, is the bridge-tree I′ and tram-pot I, supporting the shaft B, which carries the runner D, pulley C, and the revolving grinding-plate H, the runner and pulley being keyed to the shaft and the plate H bolted to the runner. This runner D is cast with a central hole to fit the vertical shaft B, and with an annular flange or shoulder, *d*, to embrace the circumference of the grinding-plate H, and also with a high vertical rim, D′, completely surrounding both grinding-plates, and rising above the upper grinding-plate, G, and then curving over outwardly and extending downward in a wide drooping discharging-lip, D″, which travels in gutter F. By this construction a large annular revolving chamber, N, is formed outside of the grinding-plates, which chamber, being supplied with water, serves to wash and thus concentrate the more valuable portions of the pulp, while the lighter refuse is carried off by the overflow into the gutter F.

On the upper part of the frame A is fastened the cover E, having the hopper M cast in the same piece therewith, and provided with a suitable bearing for the upper end of the shaft B. The stationary grinding-plate G is bolted to the under side of the cover. Both of the grinding-plates are cast with a series of recesses or cells, forming the grinding-surfaces, as shown at Q, Fig. 2, a vertical section of a portion of the upper plate being shown detached in the same figure. The depth of these cells is indicated by the said fragmentary section. The whole grinding-surface of the grinding-plates is made up of these cell-partitions, as indicated in the main view, Fig. 2. Any convenient form may be given to the cells, rectangular or hexagonal, like honeycomb, for instance.

For the purpose of raising and lowering the bridge-tree and runner, the horizontal shaft K is employed. This shaft is provided with worms which mesh with toothed wheels W on screws L, which, being operated, raise and lower the bridge-tree, and also the shaft B and runner D, in the usual manner.

Attached to the frame, and surrounding both grinding-plates, is a gutter, F, having an internal lip, D′, rising above the runner, and into which the overflow from the grinding-plates is discharged over lip D″, as indicated by arrows in Fig. 1. This gutter has a series of discharge-openings, *f*, and the overhanging lip D″ of the runner, by traveling in this gutter, agitates and washes the pulp therein as it comes from the mill with the constant overflow of water, thereby separating and retaining within the gutter particles of the ore. The cover E has two or more inlets, P, for the introduction of a constant supply of water to said chamber; also, the cover E has two or more steam pipes or inlets, O, passing through the same and through the stationary grinding-plate attached thereto, and terminating in the grinding-cells Q on the face of said plate, for the purpose of carrying steam between the grinding-plates, and thus heating the ore as it is being ground. The manner in which these steam-jets are discharged between the grinding-plates is shown in Fig. 3.

The ore is fed into the hopper M and wet by a small quantity of water, and the ground ore passes from the grinding-plates into the chamber N, which is more fully described in a separate application for a patent for an improve-

ment to amalgamators. This chamber is supplied with sufficient water to sluice the pulverized ore in this chamber, where the metal remains, while the lighter pulp passes over the lip D″ into gutter F, the contents in which are freely agitated by the motion of lip D″, traveling in said gutter, where any of the finer particles of metal remain, the lighter material being further separated therefrom and carried off with the water. The presence of steam heat, together with the electricity generated by the grinding-plates, produces a powerful chemical action, generating sulphide of hydrogen whenever sulphur or any of its combinations is present.

The principal wear of the mill is on the grinding-plates, which can be easily unbolted and renewed when worn out. The dress of these plates must be modified according to the kind of ore to be ground, whether hard or soft, brittle or tough, or otherwise, and the lead or draft of the dress must be varied to suit the quality of the ore. The plates are to be made of the best iron employed for making car-wheels, and they are cast about two or three inches in thickness, including the dress Q, the faces of the plates being chilled, while the back is left soft, thus combining durability with strength.

In my mill the grinding and amalgamating are continuous, and to a certain extent the same devices enter into both the ore-grinder (including the sluicing and separation by washing) and the amalgamator, for which I have made application for a separate patent dated July 6, 1883, No. 100,116.

The mill does not require to be stopped for the purpose of being charged or discharged, or for replenishing the chamber N with mercury.

The vertical recesses R on the interior of the rim D′ are intended to hold mercury in a vertical sheet, as more fully described in the separate application for an amalgamator above referred to.

Having described my invention, what I claim is—

1. In an ore-grinding mill, the combination of the stationary cover E, provided with a cellular grinding-plate, G, and water-inlets P, shaft B, and runner D, provided with the cellular grinding-plate H, and annular chamber N, surrounding the grinding-plates of the said cover and runner, substantially as and for the purpose herein specified.

2. The combination of the stationary cover E, provided with water-inlets P, the runner D, provided with an annular receiving-chamber, N, having rim D′, and the grinding-plates, the said annular rim D′ forming the outside of the chamber N, and extending above the general surface of the cover E, substantially as herein specified.

3. The combination of the stationary cover E, provided with water-inlets P, the runner D, provided with an annular chamber, N, having rim D′, and the grinding-plates, said annular rim D′ having a downwardly-dipping lip, D″, and the annular gutter F, surrounding the rim D′ and receiving the lip D″, substantially as and for the purpose herein specified.

4. The combination of the stationary cover E, having a grinding-plate, G, the runner D, having a grinding-plate, H, and two or more steam-pipes, O O, substantially as herein described, whereby steam is admitted between the grinding-plates while the grinding is being done, for the purpose herein specified.

AUSTIN B. PAIGE.

Witnesses:
DANIEL BREED,
ISAAC T. GIBSON.