(No Model.)

J. B. WARING.

ORE CONCENTRATOR.

No. 556,567. Patented Mar. 17, 1896.

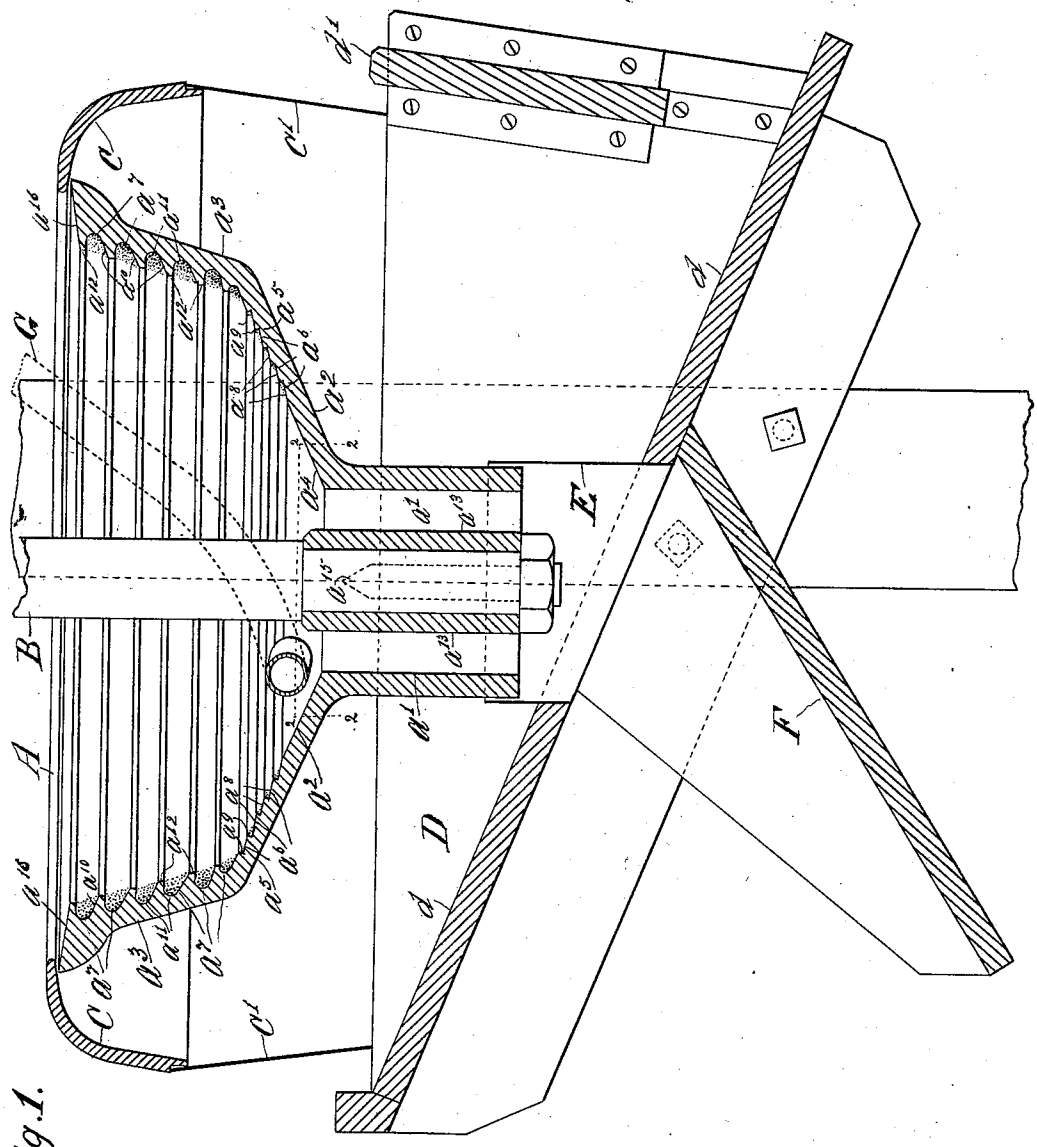

Fig. 1.

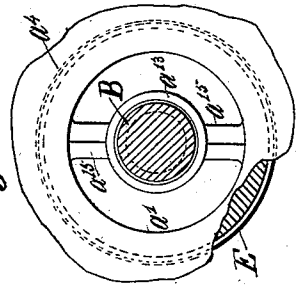

Fig. 2.

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JOHN B. WARING, OF NEW YORK, N. Y.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 556,567, dated March 17, 1896.

Application filed January 24, 1894. Serial No. 497,949. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. WARING, of the city, county, and State of New York, have invented a certain new and useful Improvement in Ore-Concentrators, of which the following is a specification.

I will describe a machine embodying my improvement and then point out the novel features in the claims.

In the accompanying drawings, Figure 1 is a central vertical section of an ore-concentrator embodying my improvement. Fig. 2 is a horizontal section, as indicated by the line 2 2, Fig. 1.

Similar letters of reference designate corresponding parts in both the figures.

A designates a concentrating-chamber of circular form and having, as here shown, a cylindric lower portion a', which is open at both ends, an acutely or abruptly flaring portion a^2 extending from the upper end of the cylindric portion a' and a less acutely-flaring portion a^3 surmounting the acutely-flaring portion a^2. The upper end of the chamber is entirely open. The lower part, a^4, of the acutely-flaring portion a^2 may be perfectly smooth on its upper surfaces, as shown in Fig. 1, but the upper part, a^5, of the acutely-flaring portion a^2 is provided on its upper surfaces with circular grooves or riffles a^6. In the interior of the less acutely-flaring portion a^3 are a number of comparatively deep grooves a^7. The grooves or riffles a^6 preferably have flat bottoms a^8, very slightly inclined downwardly toward the center of the chamber, and sides or backs a^9 extended at right angles to the bottoms a^8 and consequently inclined upwardly toward the center of the chamber. This shape I deem advantageous.

The grooves a^7 are shown as having their bottoms a^{10} extended at quite a sharp angle downwardly toward the center of the chamber. This feature is important. The sides or backs a^{11} of these grooves will preferably be rounded. The tops may be horizontal or slightly inclined downwardly toward the center of the chamber and the front edges a^{12} of the ribs separating the grooves may be vertical or otherwise.

The chamber A is provided with a central tubular hub a^{13}, which is fitted to an upright shaft B that may be sustained in bearings in any suitable manner. This shaft is represented as being shouldered above the hub a^{13} and as having a nut applied to it below said hub. Between the hub a^{13} and the cylindric lower portion, a', of the chamber A horizontal arms a^{15} extend, and these form the connection between the hub and the chamber. Preferably their upper surfaces will be inclined so as to shed material falling upon them. Obviously the space between the hub and the cylindric lower portion of the chamber will be annular except where it is traversed by these arms. The upper surface, a^{16}, of the chamber is inclined downwardly toward the center of the chamber.

The upper part of the chamber A is surrounded by a stationary shell or deflector C, which may be supported in any suitable manner and on the upper end extends inwardly a slight distance above the outer portion of the top surface, a^{16}, of the chamber A.

Below the shell or deflector C is another shell C', and below this shell C' is a chamber or box D having an inclined gutter d and a door d' on the front, the latter preferably being removable to facilitate cleaning out the box.

Below the lower cylindric portion, a', of the chamber A is a shell E, which is fixed in an opening formed in the bottom of the box D. Beneath this opening is a chute F for the purpose of carrying away concentrates discharged from the chamber.

The chamber A is caused to rotate at a high velocity by imparting rotary motion to its supporting-shaft. Pulverized ore or pulp is introduced into the chamber by a chute G, (indicated by dotted lines,) so that it will fall upon the lower part, a^4, of the acutely-inclined portion a' of the chamber. The high speed of the chamber causes the pulp to spread out equally in a film over this part of the chamber, and instantly it travels outwardly and up over the riffles a^6 to the grooves a^7. In passing over the riffles the effect of change of position of the particles is to permit the heavier to move toward and hug the inner surface of the chamber. The material passes upward beyond the riffles, the heavier, still hugging the surface of the chamber, being caused to move upward and outward. The inclined

bottoms of the grooves a^7 facilitate the heavier particles remaining in contact with the chamber and enable them by accumulation in the grooves a^7 to displace the lighter particles. The lighter particles, with the water which is used in concentrating, pass to the top of the chamber and over the inclined surface a^{16} to the deflector C, whence they pass to the box D and are discharged.

The course of the material within the chamber A is indicated by dotting in Fig. 1.

After the grooves a^7 have become overcharged with concentrates the operation may be stopped, and then the concentrates may be washed out of the grooves by means of a stream of water escaping from a pipe, directed by the attendant. When thus removed, they pass downwardly through the chamber on the chute F to any suitable receptacle.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An ore-concentrator consisting of a chamber rotating about a vertical axis and constructed to freely permit the flow of a liquid from its central to its peripheral portion, the chamber comprising a lower portion forming a discharge for the concentrate, an upper portion provided with a number of grooves arranged one above the other and the distance from the axis of the chamber to the bottom of each groove increasing from below, upward, and a connecting portion joining the upper and lower portions of the chamber, substantially as specified.

2. An ore-concentrator consisting of a chamber rotating about a vertical axis, provided with a cylindric lower portion, an acutely-inclined portion above this cylindric portion, the lower part of the acutely-inclined portion being smooth, the upper part of said acutely-inclined portion being furnished with grooves or riffles and the less acutely-inclined upper portion provided with a number of deeper grooves, the chamber having a central bottom discharge-opening, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN B. WARING.

Witnesses:
ANTHONY GREF,
S. A. PALMER.