No. 798,278. PATENTED AUG. 29, 1905.

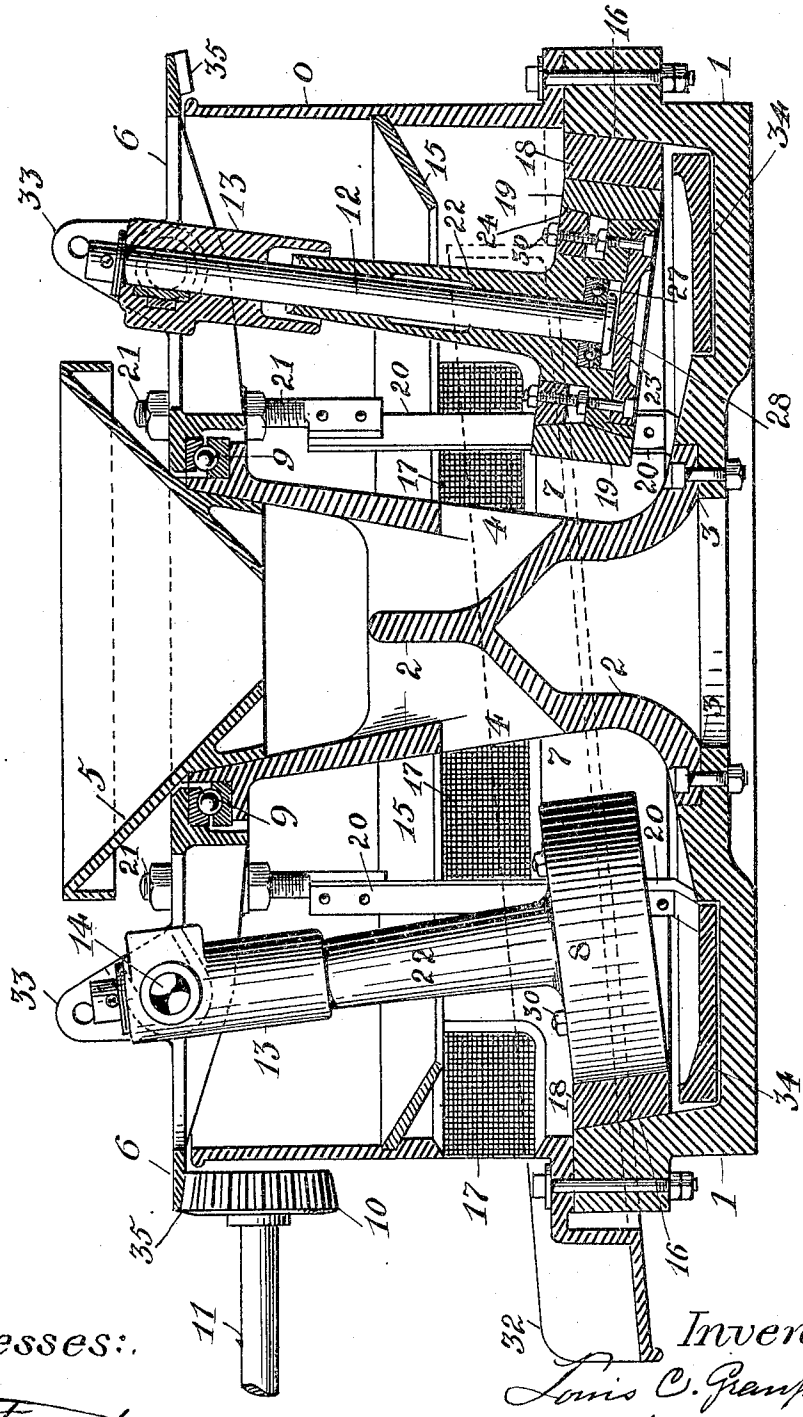
L. C. GRAUPNER.

CENTRIFUGAL WET CRUSHING AND GRINDING MILL FOR QUARTZ.

APPLICATION FILED JAN. 13, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:.

H. Montevercle.

Elmer Wickes

Inventor:

Louis C. Graupner.

by J. Richards & Co.

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2 SHEETS—SHEET 2.

Fig. IV.

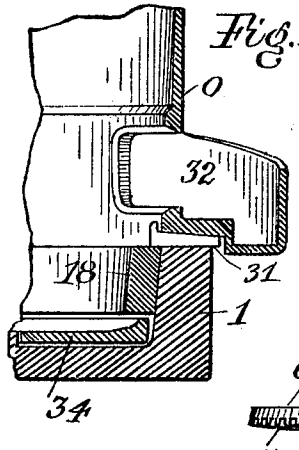


Fig. III.

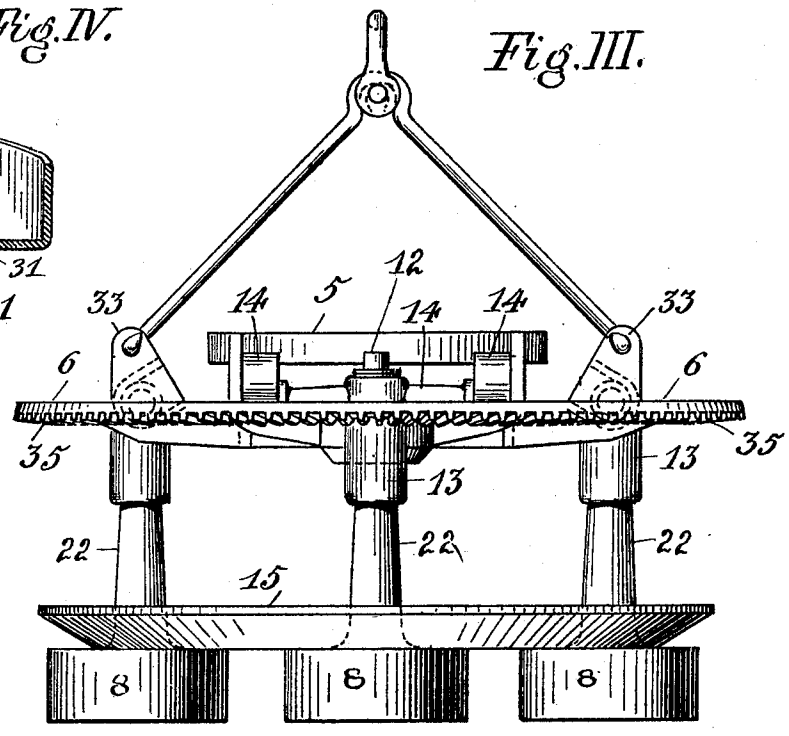
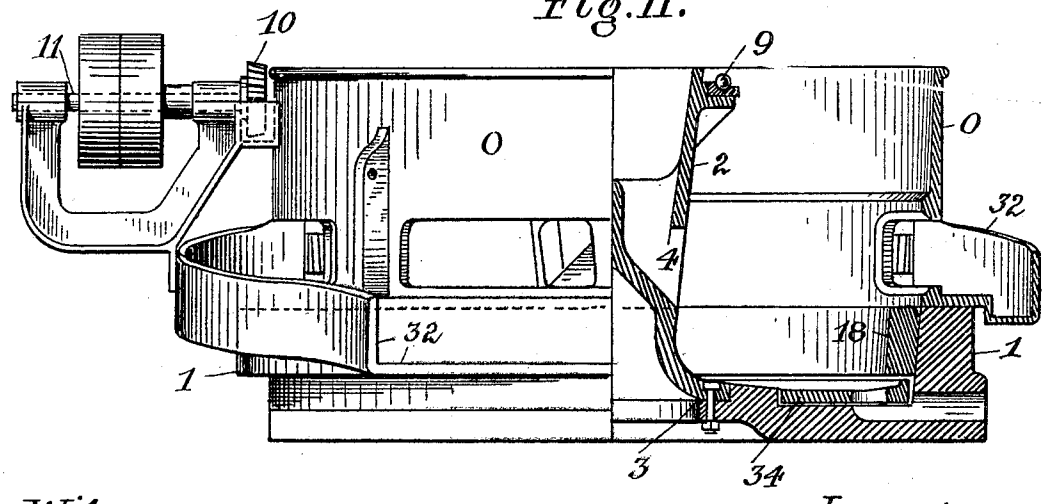


Fig. II.



Witnesses:

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UNITED STATES PATENT OFFICE.

LOUIS C. GRAUPNER, OF SAN FRANCISCO, CALIFORNIA.

CENTRIFUGAL WET CRUSHING AND GRINDING MILL FOR QUARTZ.

No. 798,278. Specification of Letters Patent. Patented Aug. 29, 1905.

Application filed January 13, 1905. Serial No. 240,895.

To all whom it may concern:

Be it known that I, LOUIS C. GRAUPNER, a citizen of the United States of America, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Centrifugal Wet Crushing and Grinding Mills for Quartz; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to certain improvements in centrifugal wet crushing and grinding mills for quartz, as hereinafter particularly described, and illustrated by drawings that form a part of this specification.

My improvements consist in various features of construction, form, and arrangement, as hereinafter described in the body of this specification and set forth in claims at the end thereof.

The objects of my improvements are to secure a more rapid and complete reduction of mineral ores, especially auriferous quartz, by a construction and arrangement of parts that permit convenient removal and replacement of the various members, also a regular and uniform supply of material and its discharge after treatment.

To these ends and others hereinafter recited, I construct machines as illustrated in the drawings now to be referred to, as follows:

Figure I is a vertical section through a centrifugal wet crushing and grinding mill for mineral ores constructed with my improvements. Fig. II is the base or fixed portion of the same machine, partially in section and with the operating parts removed therefrom. Fig. III is a side view of the operating parts raised and removed from Fig. II. Fig. IV is a detail showing the manner of securing the die-ring in the main base-frame by means of keys.

In the operation of centrifugal crushing and grinding machines as commonly constructed there is the difficulty of access to the operating and wearing parts. They also have usually devices to supply the material at the outside of the crushing zone commonly at one point only, a want of convenient and detachable means for driving the machinery from the top above the crushing plane, and other impediments that I seek to remove by my improvements, as herein explained.

Referring to Fig. I, it will be seen that the pan or main frame 1 is surmounted by the usual curb or outer wall O and is provided with a fixed central conduit 2, bolted down at 3 and provided with internal passages 4, through which the broken ore and water are supplied from a hopper 5, falling by gravity, and is distributed around the machine at 7 inside of the crushing-rollers 8, the present machine being arranged for four such rollers. At the top of the hollow member 2 is provided a ball-bearing 9, on which is mounted a revoluble plate 6, driven by a shaft 11 and pinion 10 or in other suitable manner, thus imparting a planetary motion to the pendulously-supported rollers 8, which roll and turn around their axes by means of the shafts 12, which are held in long bearings 13, mounted on trunnions 14, that have their bearings on or in the driving-plate 6. Above the rollers 8 is a removable downward-sloping shield 15, that arrests the upward splash and spray from the rollers 8 and casts the water or pulp downward, so the whole will pass out through the screens 17 when reduced to the required fineness for future treatment by the usual processes. 18 is the fixed die-ring, either whole or made in sections to form a complete circle, the sections being prepared to fit firmly against the wall 16 of the main pan or frame 1, preferably with an inclination of three to five degrees on its inner face, as shown in the drawings. This taper of the walls is an important feature that causes a wedging action and tends to hold the die-rings firmly. For further security a series of safety-keys 31 are inserted from the inside over the die-ring, as shown in Fig. IV. The inner faces of the die-ring 18, as well as the axes of the rollers 8 and their crushing-face rings 19, are all arranged in an inclined position, as shown in Fig. I, thereby bringing the crushing-faces normal to the course of the material through the machine at this point and directing the discharge from the juncture of the crushing-faces against the shield 15 and directly toward the screens 17. 20 represents shoes, brushes, or scrapers of any suitable kind to agitate and distribute or redistribute ore that collects around or beneath the rollers 8, as is common in machines of this type. These implements 20 are adjustably held in the main driving-plate 6 by the screw-studs 21, as shown in Fig. I.

Referring to Figs. II and III, these represent the machine separated by raising the

operating parts clear of the base 1 and inclosing curb O. This is accomplished by any suitable hoisting-tackle, as indicated in Fig. III, giving immediate and free access to the interior of the machine and all the operating parts thereof. The rollers 8 are composed of a central member 22, a bottom follower-plate 23, a bolted top follower-ring 24, and the crushing and grinding ring 19 around the whole, as shown in the section Fig. I. These revolve loosely on the shaft 12, held in the member 13, their weight being supported on a ball-bearing 27, resting against a collar 28 on the shaft 12. As will be seen, a downward extension of the member 13 overlaps and protects the upper end of the part 22, so that the roller-bearing 27 is securely inclosed and protected from grit. The crushing-rings 19 have a compound or double bevel on the inside, one face resting against a tapered portion of the member 22 and the other receiving the beveled follower-ring 24, held by the through-bolts 30, that also hold the follower-plate 23, as shown in Fig. I. This construction secures by a simple and single means the various parts of the crushing-rollers against derangement or loosening of the parts by concussion, also permits their being easily segregated if renewal or repairing are required. 32 is a collecting-spout for the discharged material, and 33 represents lugs for lifting the operating parts of the machine, as shown in Fig. III. 34 is a false bottom that can be substituted for one worn by the action of the ore 20.

The hopper 5 can be stationary or rest upon and revolve with the plate 6, the latter being preferable because of the material descending with a swiveling motion that causes a better distribution through the passages 4.

Other parts of the machine not particularly described correspond to the usual construction of centrifugal crushing and grinding machines.

In operation the rotary plate 6 is set in revolution by the gear-pinion 10, that meshes into corresponding teeth 35 on the plate 6, or this plate can be driven by a bevel friction-drive or any suitable form of transmission. When this plate 6 is set in revolution, the pendulously-supported rollers 8 swing by the action of centrifugal force under the well-known laws thereof and press against the die-ring 18 with a force proportional to speed of the machine, hence controllable as the working requirements may demand and not constant, as in the case of gravity crushing-roller machines for like purpose.

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

1. In a centrifugal ore-crushing machine, a pan constituting a base, a die-ring with inclined face secured to the inner wall-face of said pan, a plurality of pendulously-mounted rollers whose faces contact with said die-ring, a central conduit secured to said pan, having lateral openings for delivery of the ore to the rollers, and a hopper above said conduit.

2. In a centrifugal ore-crushing machine, a pan constituting a base, a die-ring with inclined face secured to the inner wall-face of said pan, a central conduit secured to said pan, having lateral openings for delivery of the ore to the rollers, a disk plate revolubly mounted on the top of said conduit on suitable bearings, and a plurality of pendulously-mounted rollers carried by said plate, their faces arranged to contact with and press laterally against said die-ring.

3. In a centrifugal ore-crushing machine, a base-pan, a die-ring with inclined face, secured to the inner wall-face of said pan, a central delivery-conduit with lateral openings for the passage of ore, a hopper above said conduit, a plate revolubly mounted on said conduit, rollers pendulously mounted on said plate so that their faces normally press against said die-ring when stationary, and means for rotating said plate.

4. In a centrifugal crushing and grinding machine of the character described, a plurality of pendulously-suspended crushing-rollers swung from a revoluble driving disk or plate, the latter detachably held on a hollow truncated conical support centrally fixed to a base frame or pan and free to be lifted therefrom to give access to the rollers and the fixed dies against which the rollers bear, arranged and operating substantially as specified.

5. In a centrifugal ore-crushing machine, a base-pan, a die-ring with inclined face, secured to the inner wall-face of said pan, a central delivery-conduit secured to said pan, a disk plate revolubly mounted on the top of said conduit, pendulous rollers carried by said plate, their faces contacting with said die-ring, and a removable downward-sloping shield secured above said roller-faces, to arrest the upward splash of the material operated upon.

6. In a centrifugal ore-crushing machine, a base-pan, a central delivery-conduit secured to said pan, a die-ring with inclined face secured to the inner wall-face of said pan, an annular plate revolubly mounted on the top of said conduit on suitable bearings, a plurality of pendulous rollers mounted on and carried by said plate, their roller-faces contacting with said die-ring, and means for lifting said plate and rollers clear from the base-pan and the stationary parts connected therewith.

7. In a centrifugal ore-crushing machine, a base-pan, an ore-conduit centrally secured in said pan, a die-ring with inclined face secured to the inner wall-face of said pan, a revoluble

disk plate removably mounted on the top of said conduit, on suitable bearings, a plurality of crushing-rollers pendulously mounted on said plate, their roller-faces contacting with the inclined die-face, and adapted to press against the same by centrifugal force when rotating, the crushing-faces of said rollers being approximately parallel with the inclined die-face and inclined with respect to the vertical axis of movement.

8. In a centrifugal ore-crushing machine, a plurality of crushing-rollers pendulously mounted to revolve in a circle and act by centrifugal force, each roller consisting of a central revoluble member, countersunk at bottom and provided with a cap-plate in the countersink, a crushing-ring internally beveled in opposite directions, said central member beveled to fit one of said ring-bevels, a follower-plate beveled to fit the other ring-bevel, and screw-bolts passing through said central member, cap-plate, and follower-plate, for tightening or loosening the same in the crushing-ring, substantially as specified.

9. In a centrifugal ore-crushing machine, a pan constituting a base, a central conduit secured to said pan, a plurality of pendulous rollers revolubly mounted on the top of said conduit, a die-ring fitted against the inner face of the pan-wall, in the contacting path of the said pendulous rollers, and through-keys inserted over the top of said die-ring, to secure the same against rising, substantially as specified.

10. In a centrifugal ore crushing and grinding machine of the character described, a main pan or base, a plurality of centrifugal crushing-rollers therein, the latter driven by a disk or plate on which the crushing-rollers are pendulously mounted and gear-teeth on the bottom side of this plate that can be directly lifted from a driving-gear pinion when the driving disk or plate is raised, substantially as specified.

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

LOUIS C. GRAUPNER.

Witnesses:
HENRY C. DROGER,
ELMER WICKES.