No. 828,456. PATENTED AUG. 14, 1906.

J. Y. BYERS & J. W. MYER.

QUARTZ MILL.

APPLICATION FILED APR. 19, 1905.

2 SHEETS—SHEET 1.

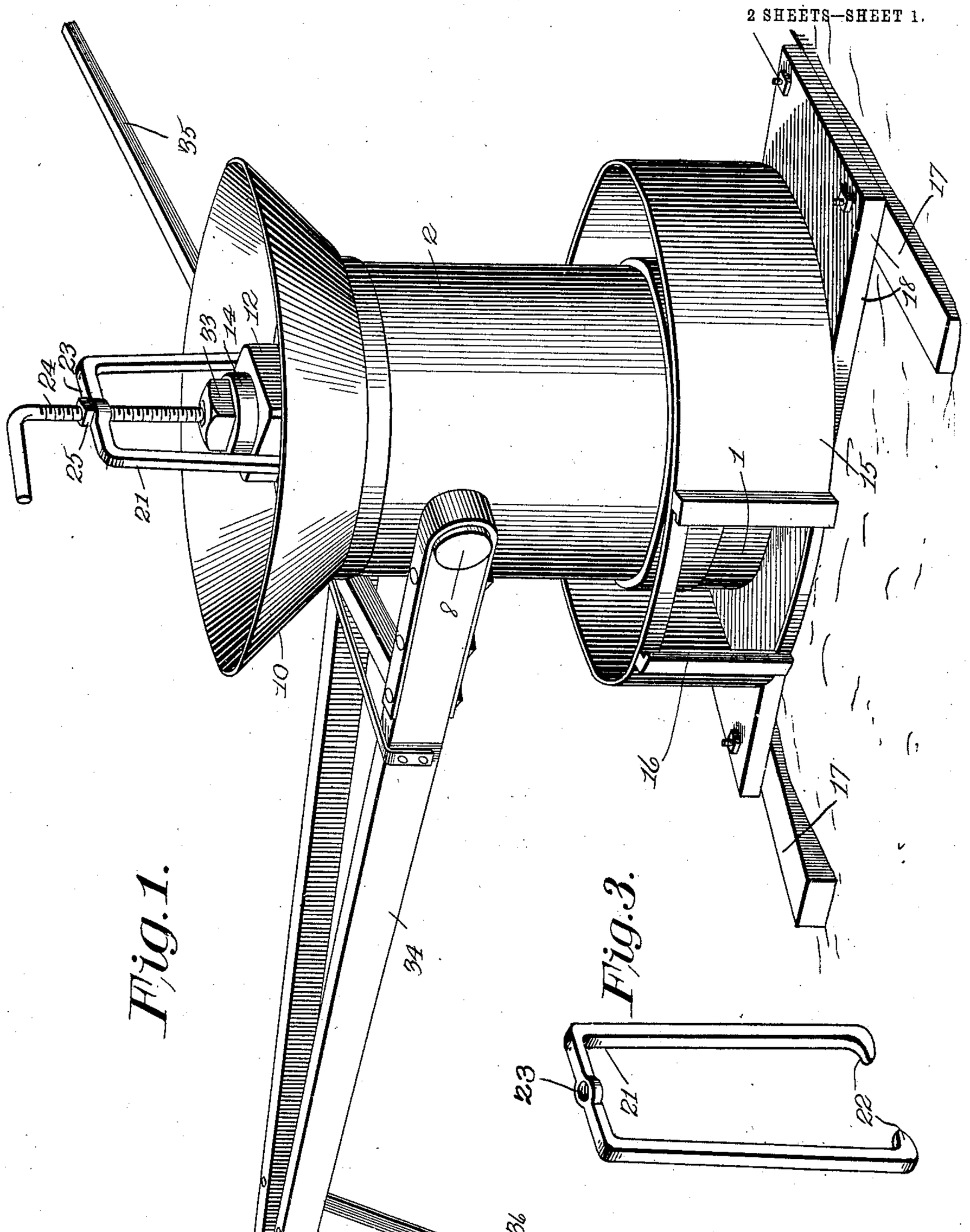

Fig. 1.

Fig. 3.

Witnesses
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2 SHEETS—SHEET 2.

Fig. 2.

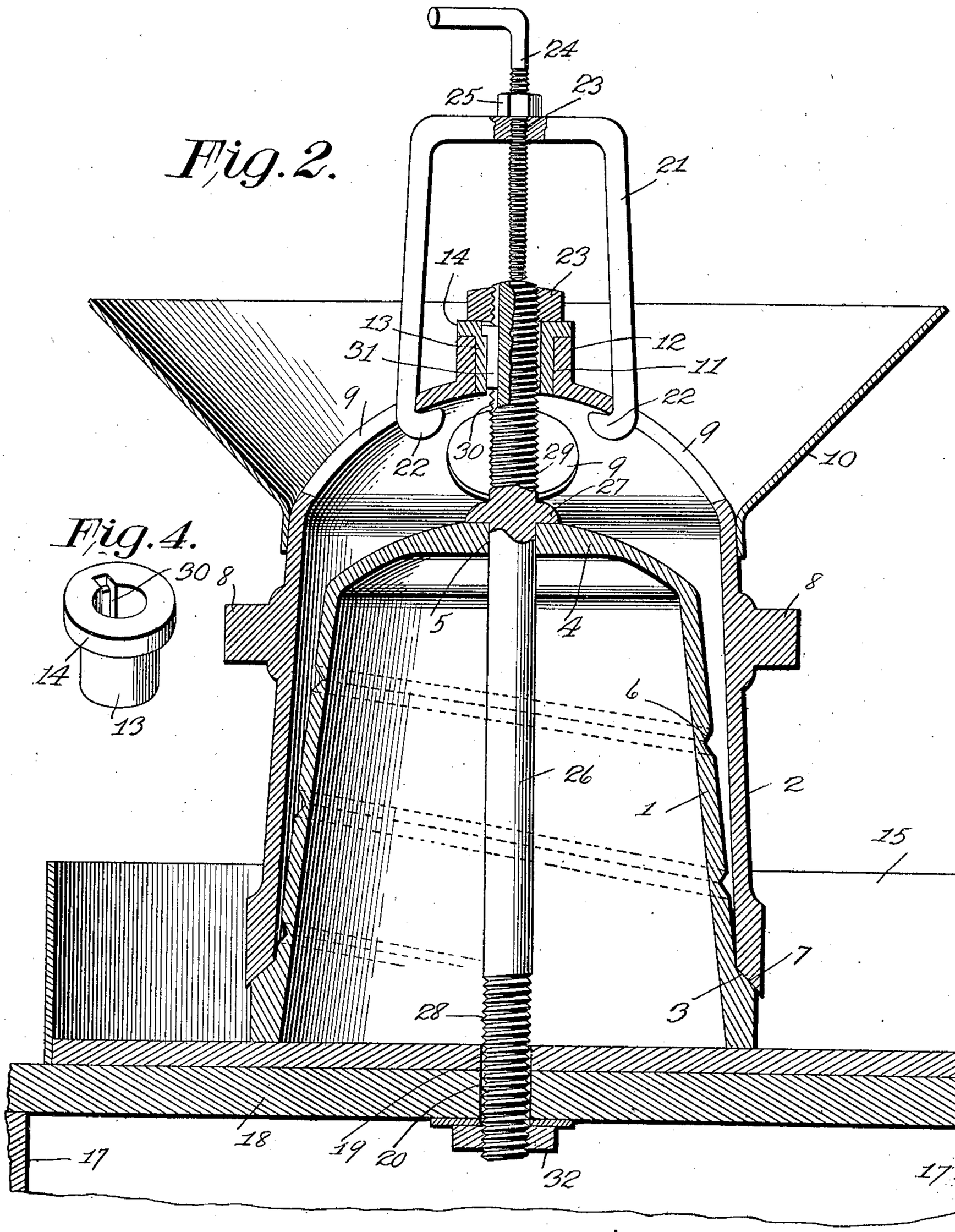

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN Y. BYERS AND JAMES W. MYER, OF SAN DIEGO, CALIFORNIA.

QUARTZ-MILL.

No. 828,456. Specification of Letters Patent. Patented Aug. 14, 1906.

Application filed April 19, 1905. Serial No. 256,443.

To all whom it may concern:

Be it known that we, JOHN Y. BYERS and JAMES W. MYER, citizens of the United States, residing at San Diego, in the county of San Diego and State of California, have invented a new and useful Quartz-Mill, of which the following is a specification.

This invention relates to quartz-mills such as are used for pulverizing rock, ores, and the like.

Among the objects of the invention are to so improve the construction of the mill as to enable it to operate with a minimum degree of friction; to reduce the number of the necessary parts and to simplify the construction of the same; to so construct the parts that the mill may be easily and quickly assembled or taken apart for storage or transportation; to make the individual parts as light as possible consistent with strength in order to facilitate the transportation of the mill in mountainous regions, where it will frequently have to be transported upon the packs of pack-animals, and generally to simplify and improve the construction.

With these and other ends in view, which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of embodiment of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that the right is reserved to any changes, alterations, and modifications to which recourse may be had within the scope of the invention and without departing from the spirit or sacrificing the efficiency of the same.

In said drawings, Figure 1 is a perspective view of a quartz-mill constructed in accordance with the principles of the invention, showing the same in operation. Fig. 2 is a vertical sectional view of the same. Fig. 3 is a perspective detail view of the cylinder-supporting yoke. Fig. 4 is a perspective detail view of the collar upon which the cylinder rotates.

Corresponding parts in the several figures are indicated by like characters of reference throughout.

The improved mill includes an inner stationary grinding member 1 and an outer revoluble grinding member 2. The inner grinding member is of conoidal shape, and it is provided near its lower edge with an annular offset or shoulder 3 of greater obliquity than the sides of the grinding member, said shoulder constituting by itself a conic frustum. The top 4 of said inner grinding member has a central opening 5, and the circumference of said grinding member has been shown as being provided with a spiral groove 6.

The outer grinding member 2, which will be hereinafter designated the "cylinder," has been illustrated as a bell-shaped casting having a conoidal bore or opening which more nearly approaches a cylindrical shape than the walls of the grinding member 1. The lower edge of the cylinder 2 is oblique, as shown at 7, to coincide with the shoulder 3 of the grinding member 1. The cylinder is provided with trunnions 8, and the top thereof has feed-openings 9. A feed-pan or hopper 10 is fitted upon the upper end of the cylinder. The top of the latter is also provided with a centrally-disposed aperture 11, surrounded by a flange 12. 13 is a bushing fitting in the flanged aperture 11 and provided with a flange 14, resting upon the upper edge of the flange 12.

The inner grinding member is supported for operation upon a base-pan 15, sometimes known as the "amalgamating-pan," said pan having an outlet 16, for which a gate may be provided to regulate the escape of pulp from said pan. The latter is supported in operative position upon a foundation 17, suitably constructed of planks and timbers, a main supporting-plank 18 being preferably disposed in such a manner that access may be had to the under side thereof for the purpose of assembling the mill, as will be presently described. The base-pan 15 and the supporting-plank 18 are provided with apertures 19 20, which are in registry with the aperture 5 in the top of the inner grinding member 1.

Connected with the cylinder 2 is a suspending-yoke 21, the arms of which terminate in hooks 22. This yoke is preferably constructed of spring-steel, and the hooked arms thereof are inserted through oppositely-disposed feed-openings 9 in the top of the cylinder, the hooks 22 engaging against the under side of the latter. The yoke 21 has a threaded opening 23 for the passage of a set-screw 24, the latter being provided with a lock-nut 25.

The parts of the mill are assembled for operation by means of a central vertical shaft or post 26, provided with a stationary flange or collar 27 and screw-threaded at its lower and upper ends, as shown at 28 29, respectively. The upper end of the shaft is also provided with a groove or spline 30 for the reception of a blind-key 31, whereby the collar 13 is secured against rotation upon said shaft.

In assembling the parts of the improved mill the base-pan 15 is placed upon the foundation and the grinding member 1 is supported upon the base-pan, and the shaft 26 is then inserted through the apertures 5, 19, and 20 until the collar 27 rests upon the top of the grinding member. A nut 32 is now adjusted upon the lower end of the shaft and tightened against the under side of the foundation-plank until the grinding member 1 is absolutely secured against rotation. The cylinder 2 is now placed in position with its oblique lower edge resting upon the shoulder or offset 3 of the inner grinding member, and the bushing 13 is next adjusted in position, followed by the key 31, whereby it is secured against rotation. A nut 33 is now mounted upon the upper end of the shaft, but is not entirely tightened against the upper side of the bushing 13. By tightening the set-screw 24 of the suspending-yoke 21 against the upper end of the shaft 26 the cylinder 2 may now be slightly eased from its seat upon the shoulder 3, after which the nut 33 is moderately tightened and the lock-nut 25 is screwed home to prevent displacement of the set-screw 24, which latter regulates the degree of fineness of the output. The material to be ground may now be shoveled into the hopper 10 and the cylinder may be rotated by power of any description. For purposes of illustration the device has in Fig. 1 been shown equipped with a sweep 34 and a lead-pole 35 for the attachment of horse or other animal power, the sweep being provided with a ground-engaging runner 36.

The operation of the device is obvious. The material to be operated upon is gradually crushed and disintegrated between the walls of the grinding members, the distance between which gradually decreases until the crushed material finally escapes, as powder or pulp, between the grinding-faces formed by the shoulder 3 and the oblique edge 7 of the respective grinding members. The spiral groove in the inner grinding member assists in feeding the material in a downward direction; but said groove may be modified or dispensed with, if desired.

It will be seen that under this construction the actual support of the revoluble grinding member or cylinder is the point of the set-screw 24 and that consequently there is practically no friction between the parts of the mill. It is true, however, that in operation the material escaping between the grinding-faces 3 and 7 will force the cylinder 2 in an upward direction until the upper edge of its flange 11 bears against the under side of the flange 14, upon the bushing 13, which latter is held against rotation upon the shaft by the key 31 and against longitudinal displacement by the nut 33. Friction between the opposing faces of the parts 11 and 14 may obviously be reduced by lubrication or by the use of antifriction devices of any well-known and approved construction.

From the foregoing it will be seen that a mill has been provided for the purpose of crushing quartz which is light, durable, and of great simplicity, while practical experience has demonstrated the fact that its capacity greatly exceeds that of many other mills of much greater weight.

An important consideration in connection with this improved device is the facility with which the fineness of the product may be regulated. Another very important advantage resides in the facility with which the mill may be taken apart and again assembled without the slightest danger of losing or misplacing the parts.

Having thus described the invention, what is claimed is—

1. A base member, an inner grinding member, a central shaft, and clamping means assembling said base member, grinding member and shaft positively against rotation; in combination with a grinding-cylinder, a suspending yoke or hanger for the same, and a set-screw extending through said yoke and bearing upon the upper end of the shaft to support the cylinder for rotation.

2. In a grinding-mill, a central shaft, a base and a grinding member rigidly assembled thereby, a flanged bushing slidably engaging the upper screw-threaded end of the shaft, and means for preventing said bushing from rotating upon the shaft; in combination with an outer grinding-cylinder engaging said flanged collar, means for preventing longitudinal displacement of the latter upon the shaft, and means including a set-screw bearing against the upper end of the shaft for supporting the grinding-cylinder in operative position upon said shaft.

3. A grinding-cylinder having feed-openings, in combination with a resilient suspending-yoke having inturned hooked ends sprung into and engaging the cylinder through said openings.

4. In a grinding-mill, a central stationary supporting-shaft, a grinding-cylinder supported for rotation upon said shaft by means including a bushing upon a threaded portion of the shaft, a yoke having a threaded opening and a set-screw engaging the same and bearing upon the central shaft, and a lock-nut upon said set-screw.

5. In a grinding-mill, a central shaft, a base

and a grinding member rigidly assembled thereby, an outer grinding-cylinder, a suspending-yoke connected with the latter, and a set-screw threaded through said yoke and bearing upon the central shaft.

6. In a grinding-mill, a central shaft having threaded portions at its upper and lower ends and provided with a longitudinal groove at its upper end, a base and a grinding member assembled by said shaft, an outer grinding-cylinder, a yoke connected with the latter, a set-screw threaded through said yoke and bearing upon the upper end of the shaft, a flanged bushing upon the latter engaging the grinding-cylinder, a key securing said bushing against rotation upon the shaft, and a nut upon the latter securing said collar against longitudinal displacement.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

JOHN Y. BYERS.
JAMES W. MYER.

Witnesses:
G. T. VERNON,
A. B. YATES.