

No. 744,451.

PATENTED NOV. 17, 1903.

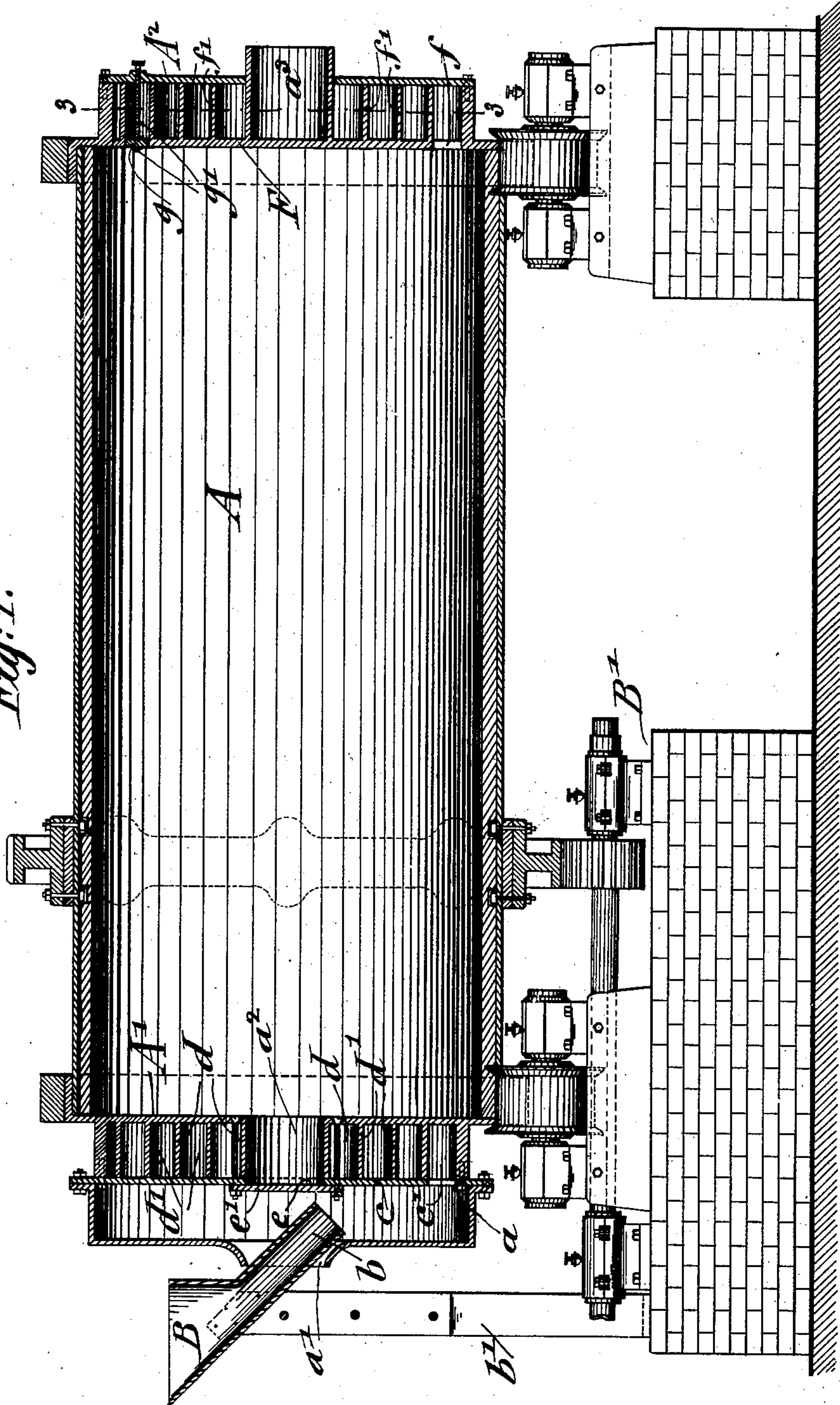
M. F. ABBÉ.
TUBULAR BALL MILL.

APPLICATION FILED JULY 30, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig: 1.



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2 SHEETS—SHEET 2.

Fig: 3.

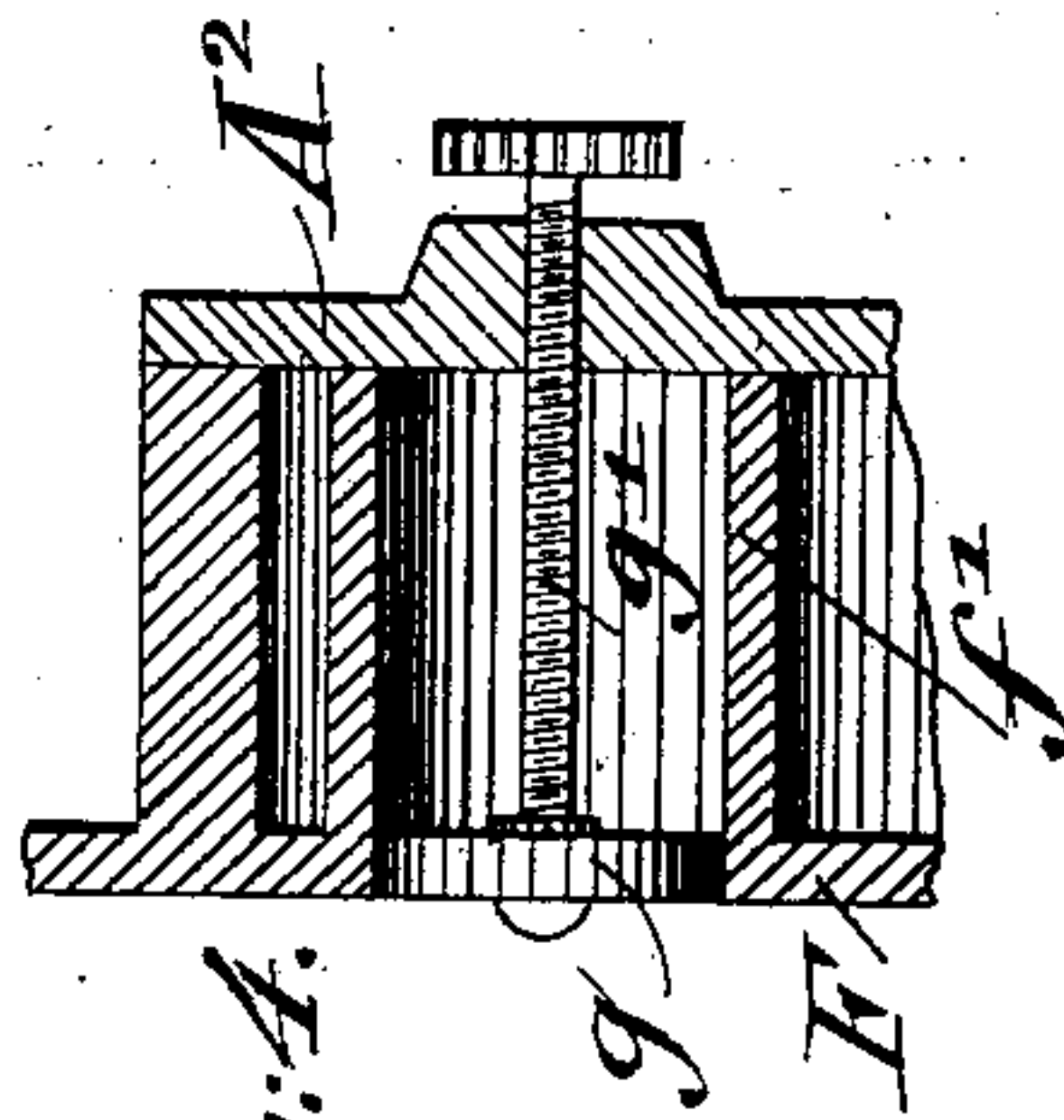
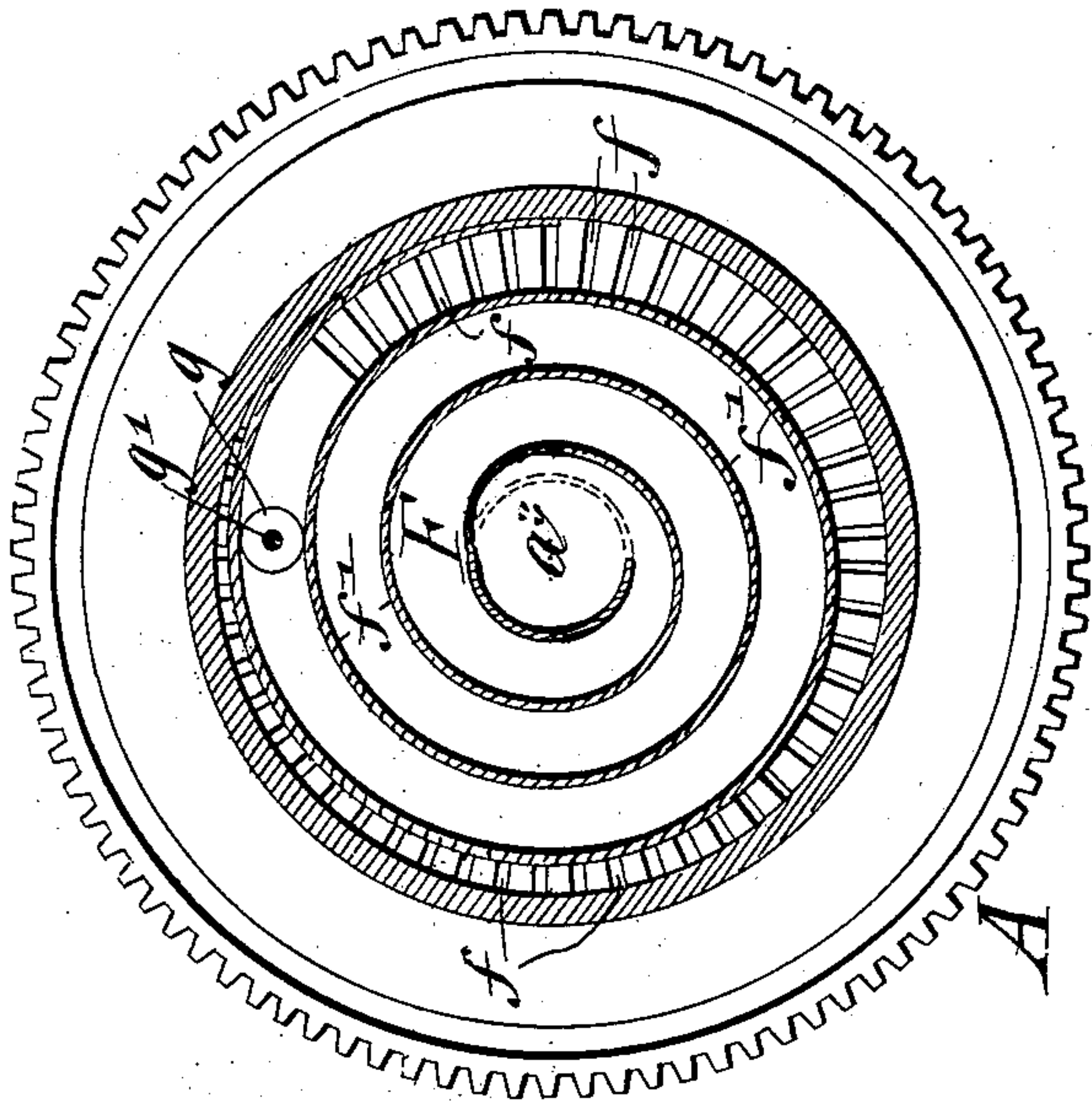
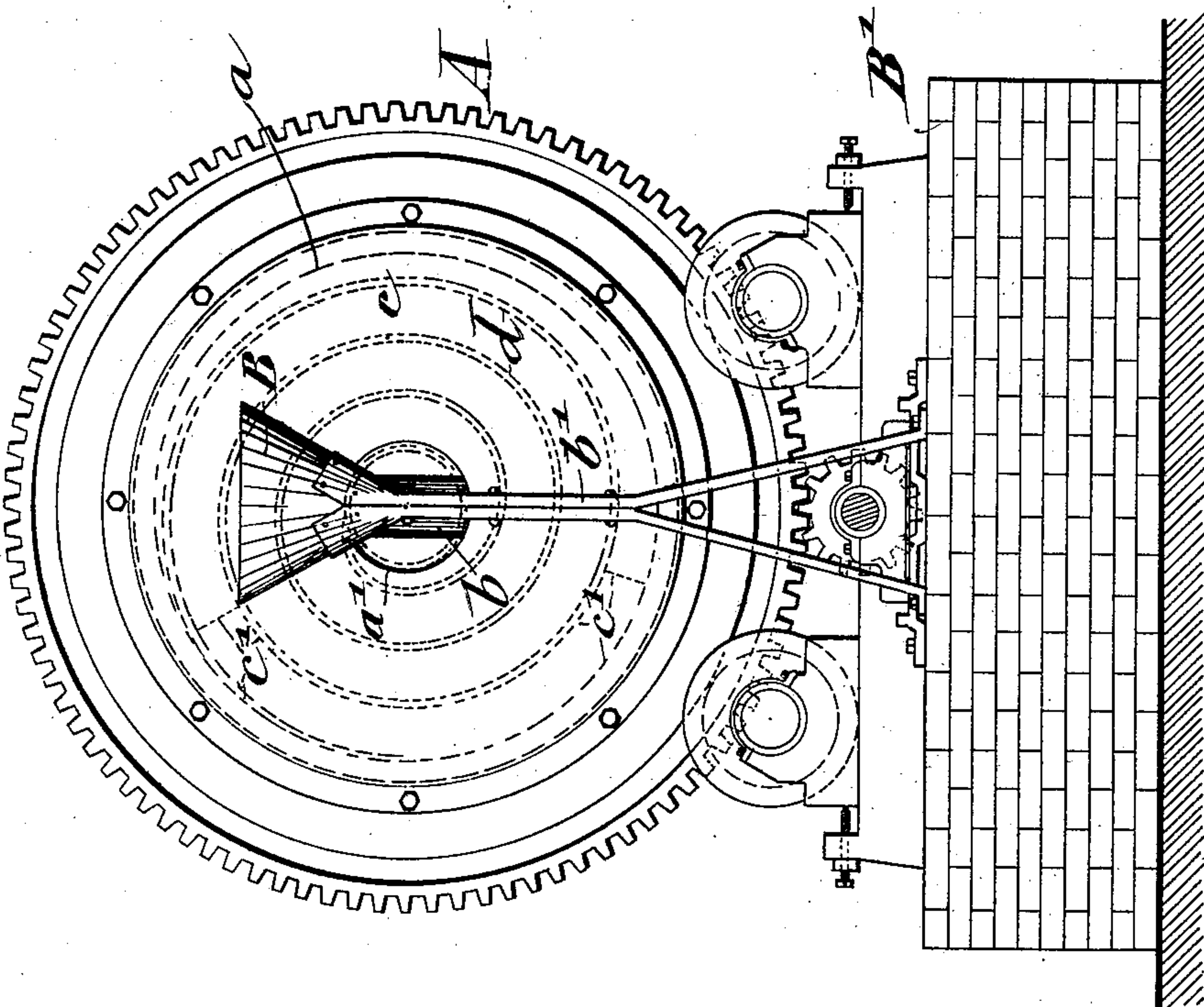


Fig: 4.

Fig: 2.



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UNITED STATES PATENT OFFICE.

MAX F. ABBÉ, OF NEW YORK, N. Y.

TUBULAR BALL-MILL.

SPECIFICATION forming part of Letters Patent No. 744,451, dated November 17, 1903.

Application filed July 30, 1902. Serial No. 117,617. (No model.)

To all whom it may concern:

Be it known that I, MAX F. ABBÉ, a citizen of the United States, residing in New York, borough of Manhattan, and State of New York, have invented certain new and useful Improvements in Tubular Ball-Mills, of which the following is a specification.

This invention relates to certain improvements in grinding-mills of the ball or pebble class; and the particular features of the invention reside in the means for feeding the material to the cylinder to be ground and means for discharging the finished material from the cylinder.

The objects of the invention are to provide means whereby the material for grinding can be fed uniformly into the cylinder by providing a feed-chamber in its front end having a spiral way which by the revolving of the cylinder elevates the material to be ground, so as to convey it into the cylinder, also to provide a similar device at the rear end of the cylinder for facilitating the discharge of the ground or pulverized material, and, further, to afford a simple means for emptying the cylinder of the pebbles or balls from time to time for the purpose of repairing the cylinder or for sorting the pebbles.

For these purposes the invention consists of a tubular ball-mill comprising a horizontal cylinder, a feed-chamber at the front end of the cylinder provided with a central opening in its vertical front wall, a hopper having its throat extending into said opening, a partition-wall in said feed-chamber dividing the same into two compartments, and a spiral wall arranged in the inner one of said compartments to provide a spiral way that communicates with the outer compartment at the circular wall of the chamber and with the cylinder at its center, so that the material can be elevated from the lowermost point inwardly to the center in a uniform manner, and a similar spiral way at the discharge end of the cylinder for elevating the pulverized material to a central discharge-outlet in the rear wall of the cylinder, and a removable plate arranged at the rear end of the cylinder for permitting communication between the interior of the cylinder, adjacent its periphery, and the spiral way for discharging the

pebbles, as will be more fully described hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a grinding-mill having my improved feeding and discharge devices. Fig. 2 is a front end view of the same. Fig. 3 is a vertical transverse section on line 3 3, Fig. 1, and Fig. 4 is an enlarged detail section of a portion of the discharge end of the cylinder.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the horizontal cylinder of a tubular grinding-mill, which is constructed and mounted, essentially, in the same manner as that set forth in Letters Patent No. 702,757, granted to me June 17, 1902; but I do not limit the application of my invention to this particular type of mill. The front end of the cylinder A is formed with a circular extension or feed-chamber *a*, which has in its front vertical wall an opening *a'*, that is concentric with the axis of the cylinder. Into this opening projects the throat *b* of a hopper B, which latter is supported in stationary position on a standard *b'*, that is removably bolted on the front pillar *B'*. The feed-chamber is divided by a vertical partition-wall *c* into two compartments and into the front one of which the throat of the hopper extends and in the other is provided a spiral wall *d*, that connects with the front wall *A'* of the cylinder and the partition-wall *c*, so as to form a spiral way or channel *d'*.

The partition-wall is provided with a segmental opening *c'*, as shown in dotted lines, Fig. 2, that extends around the outer portion contiguous with the circular wall of the feed-chamber in an arc of approximately one hundred and twenty degrees, and through this opening the spiral way *d'* communicates with the front compartment at its outer end, while its inner end communicates with the interior of the cylinder through a central opening *a''* in the front wall thereof. The coarse material that is fed into the front compartment of the feed-chamber *a* through the hopper B settles at the bottom thereof and during the rotation of the cylinder part of the material enters the spiral way *d'* when the opening *c'* is in lowermost position, and as the rotation

continues the material that is confined in the open portion of the spiral way is gradually moved upwardly or elevated toward the center by reason of the spiral wall. Each revolution of the cylinder carries the material upwardly one turn of the spiral way, the material, however, filling only the lower portion of each turn or volute of the spiral way, and it is constantly raised to the center, where the elevating action of the spiral wall ceases and the material is crowded laterally thereat by the advancing material below, so as to be fed through the opening a^2 in the front wall of the cylinder.

It is preferable to provide a manhole at one of the ends of the cylinder instead of providing it in the body thereof, so as to render the construction less costly and the relining of the cylinder less difficult. A manhole e is therefore provided in the partition-wall of the feed-chamber in line with the openings a' and a^2 , respectively, of the front walls of the feed-chamber and cylinder and has the usual cover-plate e' .

The discharge of the material after it has been ground takes place at the rear end of the cylinder, which is provided with a spirally-arranged way similar to that at the front or inlet end. As shown in Figs. 1 and 3, F is a secondary wall, which is provided with a plurality of slots f , arranged in one or more turns of the spiral way and which are sufficiently small to permit only the fine particles of material to pass, said spiral way being formed by a spiral wall f' , arranged between the secondary wall and the end wall A^2 of the cylinder. The secondary wall is provided with a central outlet extension or spout a^3 . The ground material feeds through the openings f , entering the spiral way or channel, and is elevated by the spiral wall f' to the central outlet or spout a^3 , where the constantly-advancing material below forces the foremost material gradually and uniformly therefrom.

In order to provide for the emptying of the cylinder, as in the case of repairing the same or when it is desired to assort the pebbles, the secondary wall F is provided with an opening adjacent to the circular wall of the cylinder, said opening being closed by a removable plate g , which is swiveled on the inner end of a threaded rod g' . The rod g' screws in a threaded opening in the end wall A^2 to retract or advance the plate g , so as to open or close the opening in the partition-wall. When the plate g is screwed out to its full extent, the interior of the cylinder is then in communication with the spiral way, so that by the rotation of the cylinder the pebbles will feed out in the same manner as the ground material does.

By means of my improved mill a steady and uniform operation of grinding is obtained by reason of the rate of feed and discharge being uniform. It will be observed that the discharge device is particularly

adapted for carrying off the ground material from a point where it is in its best condition—that is to say, from the bottom of the mass where it is the finest and more remote from the coarse particles at the top of the mass—and is then elevated to a central or axial point, so as to discharge in a constant stream. The form of feed device permits of the periodical replenishing of the mill with pebbles, as in the case of the used pebbles becoming reduced to a size too small for efficient service then new pebbles can be added from day to day by feeding them into the feed-chamber through the hopper separately or with the material to be ground during the operation of the machine, thus obviating the necessity of removing the cover-plate of the manhole, as in the mills of usual construction.

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

1. In a grinding-mill, the combination, with a horizontal cylinder rotatably mounted, of a feed-chamber at the front end thereof, a partition-wall dividing the feed-chamber into two compartments and provided with a segmental opening at the circumference, a hopper extending into the front compartment, and a spiral feedway in the other compartment for feeding the material, passing through the segmental opening of the partition-plate, into the cylinder, substantially as set forth.

2. In a grinding-mill, the combination, with a horizontal cylinder rotatably mounted, of a feed-chamber at the front end thereof, a partition-wall dividing the feed-chamber into two compartments and provided with a segmental opening at the circumference, a hopper leading into the front compartment, a spiral feedway in the rear compartment winding from said segmental opening to the center, and a spiral discharge-way at the rear end of the cylinder provided with a plurality of circumferentially-arranged openings, substantially as set forth.

3. In a grinding-mill, the combination, of a horizontal cylinder, a feed device at the front end thereof, a vertically-disposed spiral feedway at the rear end of the cylinder, a plurality of openings between said spiral feedway and the interior of said cylinder, a discharge-spout at the inner end of said way, and a removable plate in the end of said cylinder for communicating between said spiral way and the interior of said cylinder, substantially as set forth.

4. In a grinding-mill, the combination of a horizontal cylinder rotatably mounted, a feed-chamber at the point end thereof, a vertical partition-wall dividing said chamber into two compartments, said partition-wall having a segmental opening at the circumference thereof, the front wall of said chamber and cylinder and partition-wall having each a central opening, a removable cover-plate for the central opening of said partition-wall, a removable hopper having its throat extend-

ing through the opening of the front wall of
said feed-chamber, a spiral way between said
partition-wall and front wall of the cylinder
and extending from said segmental opening
5 to the central opening of the front wall of
said cylinder, substantially as set forth.

In testimony that I claim the foregoing as

my invention I have signed my name in pres-
ence of two subscribing witnesses.

MAX F. ABBÉ,

Witnesses:

C. BRADWAY,

HENRY J. SUHRBIER.