No. 774,273. PATENTED NOV. 8, 1904.

C. C. PRATT.

ORE GRINDING MILL.

APPLICATION FILED JAN. 19, 1904.

NO MODEL.

Fig. 1.

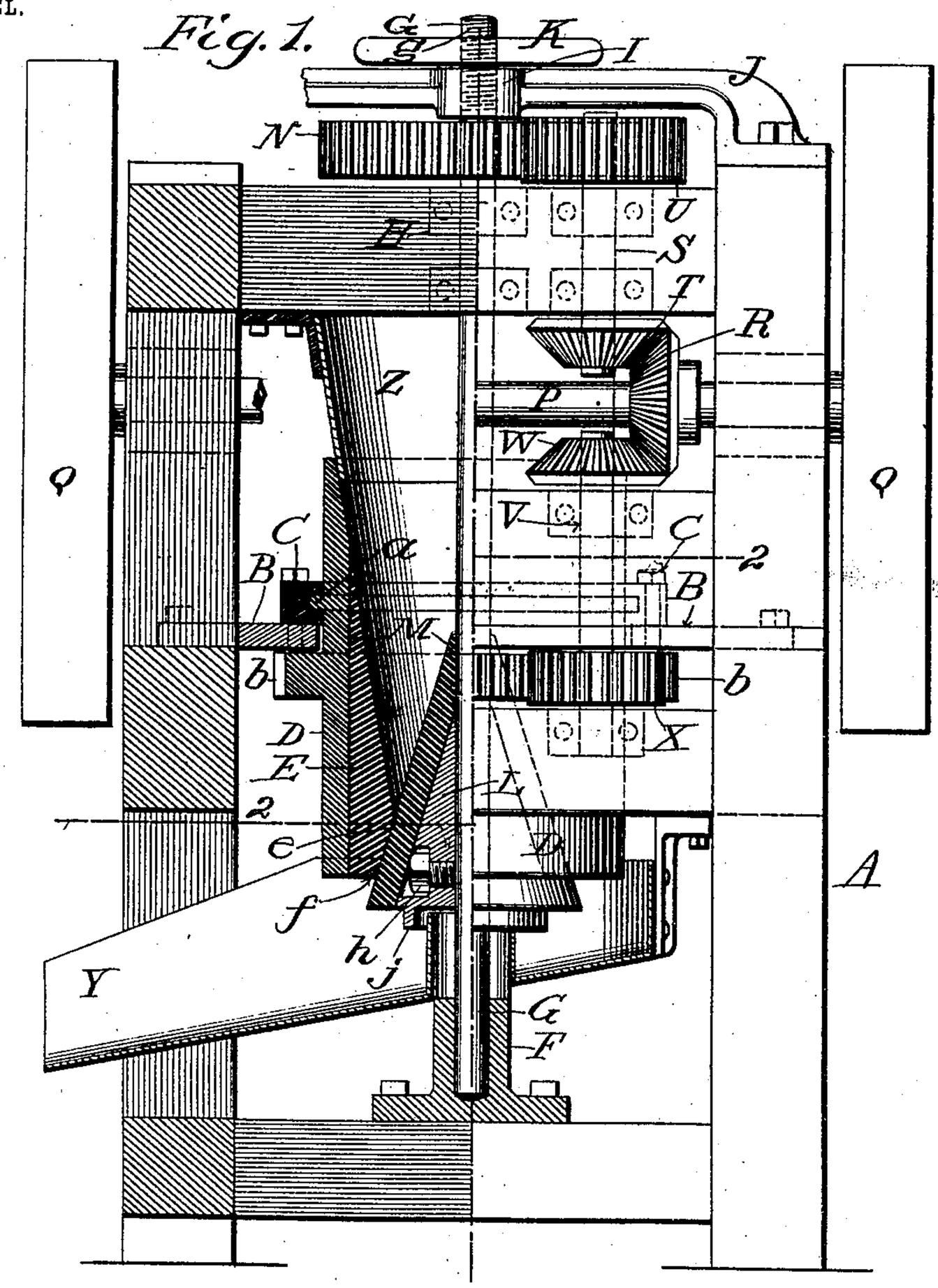
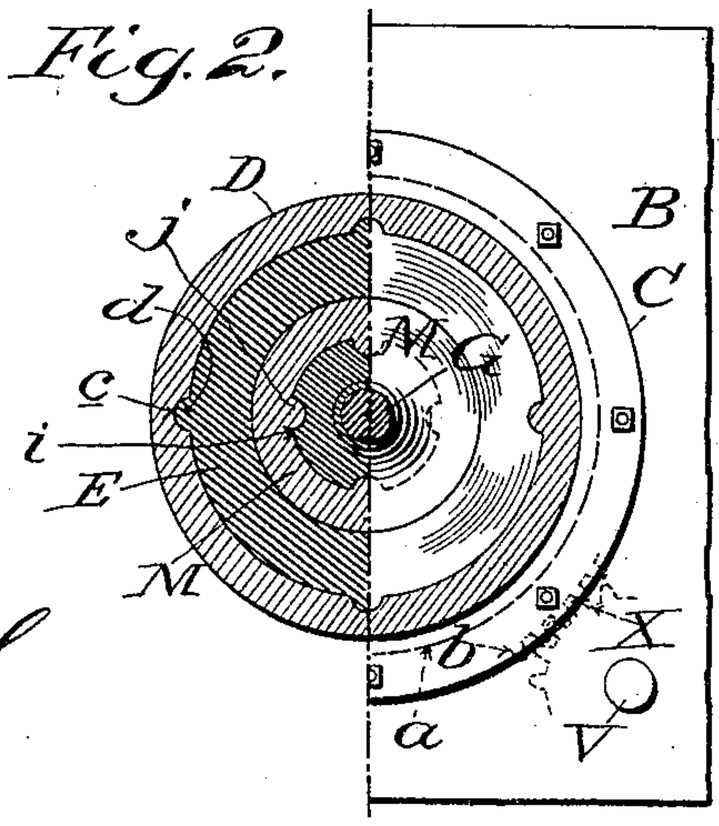


Fig. 2.



Witnesses
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No. 774,273. Patented November 8, 1904.

UNITED STATES PATENT OFFICE.

CYRUS C. PRATT, OF PORTLAND, OREGON, ASSIGNOR OF TWO-THIRDS TO JOHN E. MAYO, MARTIN L. PRATT, AND MARK WEDDELL, OF PORTLAND, OREGON.

ORE-GRINDING MILL.

SPECIFICATION forming part of Letters Patent No. 774,273, dated November 8, 1904.

Application filed January 19, 1904. Serial No. 189,746. (No model.)

To all whom it may concern:

Be it known that I, CYRUS C. PRATT, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented new and useful Improvements in Ore-Grinding Mills, of which the following is a specification.

My invention pertains to mills designed more particularly for pulverizing low-grade ore with a view of rendering the same fit for profitable working; and it consists in the peculiar and advantageous mill hereinafter described and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 is a view, partly in vertical section and partly in elevation, of my novel mill; and Fig. 2 is a view, partly in horizontal section and partly in plan, through a portion of the mill on the line 2 2 of Fig. 1.

Similar letters designate corresponding parts in both views of the drawings, referring to which—

A is the main frame of the mill, which may be either of wood, iron, or other material and of any suitable construction.

B is a horizontally-disposed annular plate bolted or otherwise fixed to the main frame about midway the height thereof.

C is a horizontal interiorly-grooved collar, preferably of brass, arranged on and fixedly connected to the plate B, and D is a vertically-disposed cylinder having an exterior rib *a* disposed in the groove of the collar C, whereby it is supported in an upright position in said collar, and also having an exterior spur-gear *b*.

The plate B and the collar C are each preferably in two semicircular sections, so as to permit of said plate and collar being placed about the cylinder D and the rib *a* of the cylinder being placed in the groove of the collar.

The cylinder D may be of cast-iron or other cheap metal and is provided interiorly with vertical grooves *c*. These latter receive complementary ribs *d* on the outer side of a shell E, of steel or other very hard metal, whereby it will be seen that the shell is fixed to the cylinder D, so as to revolve therewith, and yet may be readily withdrawn in an endwise direction and as readily replaced with a new shell when necessary. Interiorly the shell E is tapered from its upper end to a point adjacent to its lower end, as indicated by *e*, and is gradually enlarged from the latter point to its lower end, as indicated by *f*.

F is a bearing-block of steel or other suitable metal fixed in the lower portion of the main frame. G is a shaft journaled in said bearing-block and also in bearings H on the upper portion of the main frame and in a collar I, carried by a crown-bar J, fixed to the frame.

K is a hand-screw disposed above the collar I and arranged on and engaging the upper threaded portion *g* of the shaft G.

L is a cone, preferably of cast metal or other cheap metal, fixed on the shaft G through the medium of a set-screw *h* or other means and having vertical grooves *i* in its outer side and also having a depending flange *j*, and M is a mantle of steel or other very hard metal arranged on the cone L and having ribs *j* complementary to and disposed in the grooves *i* of the cone, so as to fix the mantle to the cone in such manner that the cone and mantle will revolve together as one piece, and yet the mantle may be readily removed from the cone when worn or otherwise impaired and as readily replaced with a new mantle.

Inasmuch as the shell E and the mantle M are the only parts of the mill subjected to rough usage and material wear and said shell and mantle are adapted to be expeditiously removed and replaced with corresponding new parts, it follows that said shell and mantle contribute materially in prolonging the usefulness of the mill as a whole and render prolonged operation of the mill much more inexpensive than would otherwise be the case.

The exterior of the mantle M on the cone L is contiguous to the taper bore *f* of the shell E, and hence it will be seen that the downward passage for ore is tapered toward its lower end; also, that by turning the hand-screw K the shaft G, cone L, and mantle M may be raised or lowered, so as to diminish or in-

crease the distance between the exterior of the mantle and the bore *f*, and thereby regulate the fineness of the comminuted ore.

N is a spur-gear fixed on the shaft G immediately below the collar I; P, a shaft journaled in suitable bearings in the main frame A and bearing fly-wheels Q at its opposite ends and also bearing a miter-gear R at an intermediate point of its length. S is a vertical shaft journaled in suitable bearings in the main frame and bearing a miter-gear T at its lower end, intermeshed with the gear R, and a spur-gear U at its upper end, intermeshed with the spur-gear N, and V a vertical shaft disposed in the main frame below the shaft S and bearing a miter-gear W at its upper end, intermeshed with the miter-gear R, and a spur-gear X at its lower end, intermeshed with the spur-gear *b* on the shell D.

In virtue of the gearing just described it will be observed that the cone and the cylinder will be revolved in opposite directions when the mill is in operation and also that the cone will be revolved at a higher rate of speed than the shell, this latter being due to the fact that the spur-gear U is larger than the spur-gear X in about the proportion shown. The revolving of the cone and the cylinder in opposite directions materially increases the capacity of the mill, and such capacity is further increased by the revolution of the cone and the cylinder at different rates of speed—*i. e.*, the cone at a higher rate of speed than the cylinder. From this it follows that the values in ore passed through my novel mill is freed from any base substance with which it may be coated, with the result that every particle of gold is made clean and bright and free to amalgamate and a great saving in the working of what are termed "free-milling ores" is effected.

The facility with which the shell and the mantle may be removed from the cylinder and the cone, respectively, and replaced with corresponding new parts will be better appreciated as an important advantage when it is remembered that during the continuous operation of rotary ore-grinding mills the grinding or crushing parts of the mill no matter how hard they are seldom wear longer than ten days.

Y is the launder fixed in the main frame below the cylinder and the cone and having a vertical flange surrounding the shaft G and extending upwardly from the bottom of the launder to a point above the horizontal plane of the lower edge of the flange *f* on the cone, as shown, and Z is a hopper fixed in the main frame with its lower end in the upper end of the shell D. Incident to the operation of the mill the ore to be ground is fed into the hopper Z, while the pulverized ore passes from the mill through the launder Y.

The opposed smooth surfaces of the cone and the cylinder contribute to the ore-grinding capacity of the mill, as do the two fly-wheels Q on the shaft P, by assuring evenness of motion.

I have entered into a detailed description of the construction and relative arrangement of the parts embraced in the present and preferred embodiment of my invention in order to impart a full, clear, and exact understanding of the same. I do not desire, however, to be understood as confining myself to such specific construction and relative arrangement of parts, as such changes or modifications may be made in practice as clearly fall within the scope of my invention as claimed.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The herein-described ore-grinding mill comprising a main frame having an apertured crown-bar, a bearing-block on the lower portion of the frame, a horizontally-disposed annular plate fixed in the frame at an intermediate point in the height thereof, an annular collar connected to the plate and having an interior groove, a cylinder having an exterior rib disposed in the groove of the collar, and also having interior vertical grooves, a shell arranged in the cylinder and having vertical ribs disposed in the grooves thereof; said shell being interiorly tapered from its upper end to a point adjacent to its lower end and gradually enlarged and smooth from said point to its lower end, an upright shaft journaled and movable vertically in the crown-bar of the frame and the bearing-block and having a threaded upper end, a hand-screw fixed on said end above the crown-bar, a cone fixed on the shaft and having vertical grooves, a mantle mounted on the cone and having ribs disposed in the grooves thereof, and also having a smooth surface opposed to that at the lower end of the shell, a shaft journaled in the main frame and provided with fly-wheels, a driving connection intermediate of the said shaft and the cylinder, and a driving connection intermediate of the shaft and the cone.

2. The herein-described ore-grinding mill comprising a main frame having an apertured crown-bar, a bearing-block on the lower portion of the frame, a horizontally-disposed annular plate fixed in the frame at an intermediate point in the height thereof, an annular collar connected to the plate and having an interior groove, a cylinder having an exterior rib disposed in the groove of the collar, and an exterior spur-gear, and also having interior vertical grooves, a shell arranged in the cylinder and having vertical ribs disposed in the grooves thereof; said shell being interiorly tapered from its upper end to a point adjacent to its lower end and gradually enlarged and smooth from said point to its lower end, an upright shaft G journaled and movable ver-

tically in the crown-bar of the frame and the bearing-block, and having a threaded upper end, a hand-screw fixed on the said end above the crown-bar, a cone fixed on the shaft G and having vertical grooves, a mantle mounted on the cone and having ribs disposed in the grooves thereof and also having a smooth surface opposed to that at the lower end of the shell, a drive-shaft journaled in the main frame and provided with a balance-wheel and a miter-gear, a gear-wheel N, fixed on the shaft G, a short shaft journaled in the frame and having a pinion U intermeshed with said gear N and also having a miter-gear intermeshed with that of the drive-shaft, and a second short shaft journaled in the main frame and having a miter-gear intermeshed with that of the drive-shaft, and also having a pinion intermeshed with the spur-gear of the cylinder.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CYRUS C. PRATT.

Witnesses:
JOHN E. MAYO,
E. M. SARGENT.