

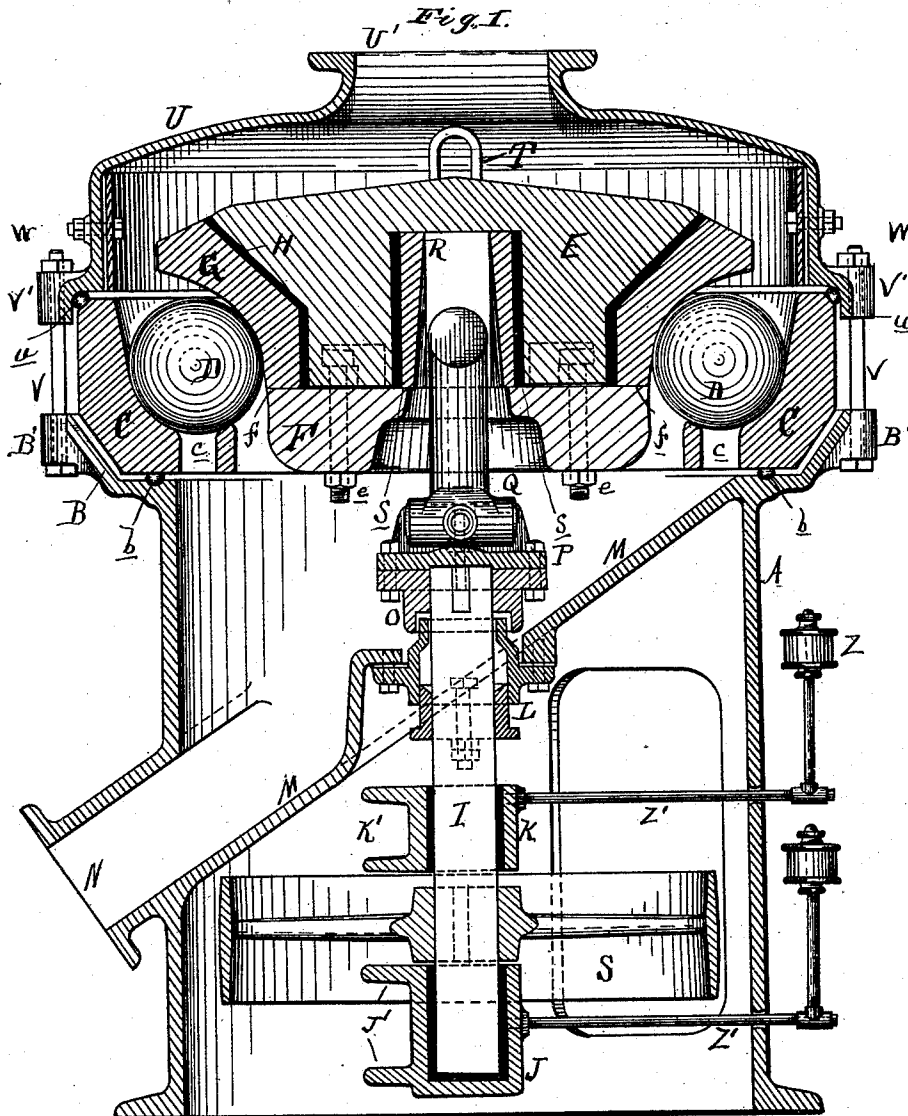
(No Model.)

2 Sheets—Sheet 1.

W. L. MORRIS.
ORE PULVERIZER.

No. 474,095.

Patented May 3, 1892.



Witnesses.
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Atty

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

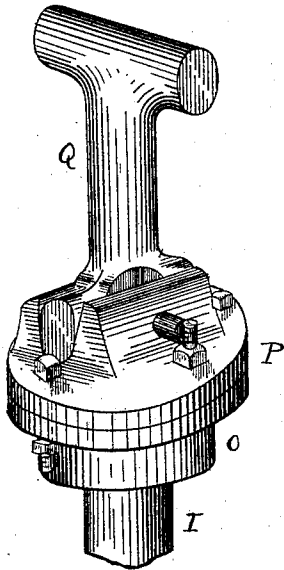
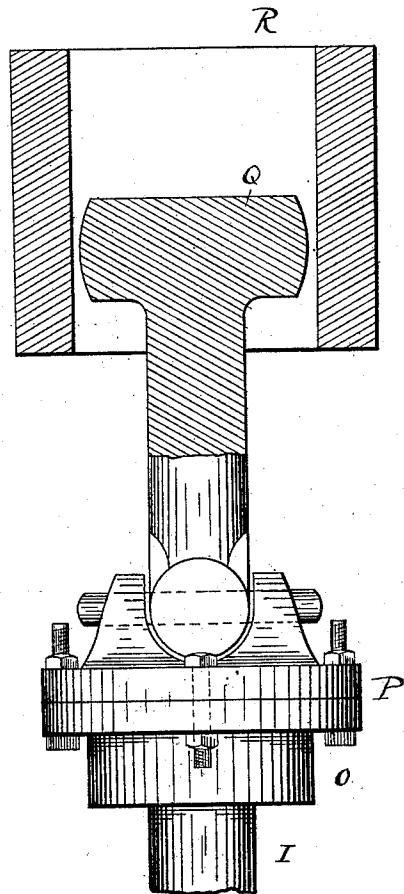


Fig. 3.



WITNESSES
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UNITED STATES PATENT OFFICE.

WILLIAM L. MORRIS, OF CLEVELAND, OHIO.

ORE-PULVERIZER.

SPECIFICATION forming part of Letters Patent No. 474,095, dated May 3, 1892.

Application filed May 6, 1891. Serial No. 391,776. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. MORRIS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Ore-Pulverizers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in machines for pulverizing ores, and has for its object the construction of a pulverizer wherein are combined simplicity in the arrangement of the parts, practicability in operation, and wherein the pulverizing appliances will readily adjust themselves under varying run of speed, and that can be easily taken apart for the purpose of repairs.

The invention consists in the peculiar construction, arrangement, and combinations of the parts, all as more fully hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 is a central vertical section through my improved machine. Fig. 2 is an enlarged perspective of the wabblor detached. Fig. 3 is an enlarged sectional elevation of the wabblor.

A represents the base, which is cylindrical in form, and is provided at its upper end with the flaring flange B. This base contains and supports the operating parts of the machine, as hereinafter described.

In the horizontal face of the flange B is formed a suitable channel adapted to receive any suitable packing *b* and upon which the lower and stationary grinding-ring C rests. The lower portion of the inner or grinding face of this ring C is formed upon the arc of a circle, as is seen in the drawings, such arc being sufficient to hold the grinding-balls D, of which latter a sufficient number are employed to nearly fill the circle of the ring. This ring is provided with an annular series of slots or openings *c*, through which the pulverized material may fall. The upper portion of the inner face of this ring C diverges upon substantially a straight line, said line intersecting at its lower end the curved line which forms the track for the balls D, slightly below the center of the circle of which said curved line is the arc, substantially as shown.

E represents a revolving weight, to the under face of which is removably secured, by means of proper bolts *e*, a weight F. The diameter of this weight F is greater than the base of the revolving weight E, thus forming an annular shoulder *f*, upon which the removable and revolving grinding-ring G rests. Between the back of this ring G and the angular periphery of the revolving weight E is placed a backing of lead H, against which the ring E bears.

The grinding-face of the ring G is formed upon the arc of an ellipse in such manner as to diminish the space between the two grinding-faces near their upper and outer edges, as is clearly shown in Fig. 1. This revolving weight is designed to rest upon the balls D when the parts are in position.

I is a vertical driving-shaft, the lower end of which is properly stepped in the socket-bearing J, which latter is retained in its proper position by means of a bridge-tree J', secured to and supported by the base A. A second bearing K, likewise supported by a bridge-tree K', is employed for the purpose of retaining the shaft in alignment. The upper end of the shaft I passes through a stuffing-box L, which is secured in the inclined shelf M in any proper and convenient manner. This inclined shelf is for the purpose of directing the pulverized material to the discharge N.

To the upper end of the shaft I is rigidly secured a collar O, which supports and carries a removable bearing P, in which latter is secured the lower end of the wabblor Q. The upper end of this wabblor is T-headed and is received in a removable bearing R, which latter is received in a proper recess formed in the axial center of the revolving weight E and rests upon the inwardly-projecting flange or shoulder *s* of the ring-weight F.

S represents a split pulley secured upon the shaft I and by means of which said shaft is rotated from any convenient power.

T is a staple secured in the upper face of the weight E, by means of which the weight may be raised when desired.

U is a cover provided with a central feed-opening U'. The lower edge of this cover is provided with a flange *u*, adapted to lap over the outer upper edge of the ring C, and is se-

cured in position by suitable bolts V, which engage with lugs or ears V' and B', laterally projecting from the flanges u and B, respectively.

5 W is a suitable packing placed between the flange u and the ring C, as shown.

Z Z represent oil-cups, which are connected by proper tubes Z' with the bearings J and K.

The parts being constructed and arranged
 10 substantially as herein described, the operation is as follows: On ore being fed to the machine through the feed-opening it falls upon the top of the revolving weight E. The centrifugal action that here takes place throws
 15 and carries the ore to the periphery of such revolving weight, whence it falls upon the rotating balls, motion to such balls being imparted from the revolving weight. The ore is pulverized between such balls and the
 20 grinding-faces of the rings C and G and is discharged through the slots c. The balls revolving between the two curved faces of the parts C and G will each carry about the same fraction of load or weight of the revolving
 25 grinder at any speed the latter may be designed to run, and this would be approximately the case even if the balls were of different diameters. In practice, the balls by gravity being at the bottom of the curve when
 30 machine is at rest, the driver being driven at a slow speed, the centrifugal force will be sufficient to raise the weight of the balls and driving E until balls come to that part of curve where the two forces will be balanced, as the
 35 speed and centrifugal force are together increased and balls raise still higher, as also will the resistance to balls raising increase by reason of the upper part of the curve in the stationary ring C being formed upon a tan-
 40 gential line nearly parallel with the axis of the revolving weight E. The diminishing of the space between the parts C and G by the peculiar formation of the curves is such that if the balls vary in diameter they will keep
 45 their centers nearly on the same circumferential line.

What I claim as my invention is—

1. In an ore-pulverizer, in combination, a primary weight, a supplemental weight suspended from said primary weight, and a grinding ring encircling said primary weight, the latter being provided with a central removable bearing for the head of the actuating-shaft, substantially as and for the purposes described. 50 55

2. In an ore-pulverizer, in combination, a base provided with a flaring flange, an inclined shelf, and a discharge-opening, a ring-track resting within said flange and having discharge-openings, rotatable balls resting within said ring-track, a driver in peripheral contact with said balls, and a cap between which and the flange of the base the said ring-track is retained against accidental displacement, the parts being constructed, arranged, 60 65 and operating substantially in the manner and for the purposes specified.

3. In an ore-pulverizer, a rotatable driver consisting of a primary weight, a supplemental weight secured to the lower end of said primary weight and projecting beyond the same, and a grinding-ring secured to said primary weight and resting at its lower end on said projecting portions of said supplemental weight, in combination with a ring-track and a series of balls between said grinding-ring and ring-track. 70 75

4. In an ore-pulverizer, the combination, with the driver having a bearing formed in its axial center, of a rotatable driving-shaft, 80 a bearing P at the upper end of said shaft, and a wobbler Q, having its lower end secured to said bearing P and its upper end T headed and received by the bearing in the driver, substantially as described. 85

In testimony whereof I affix my signature, in presence of two witnesses, this 27th day of December, 1890.

WM. L. MORRIS.

Witnesses:

H. S. SPRAGUE,

HENRY STANLEY.