

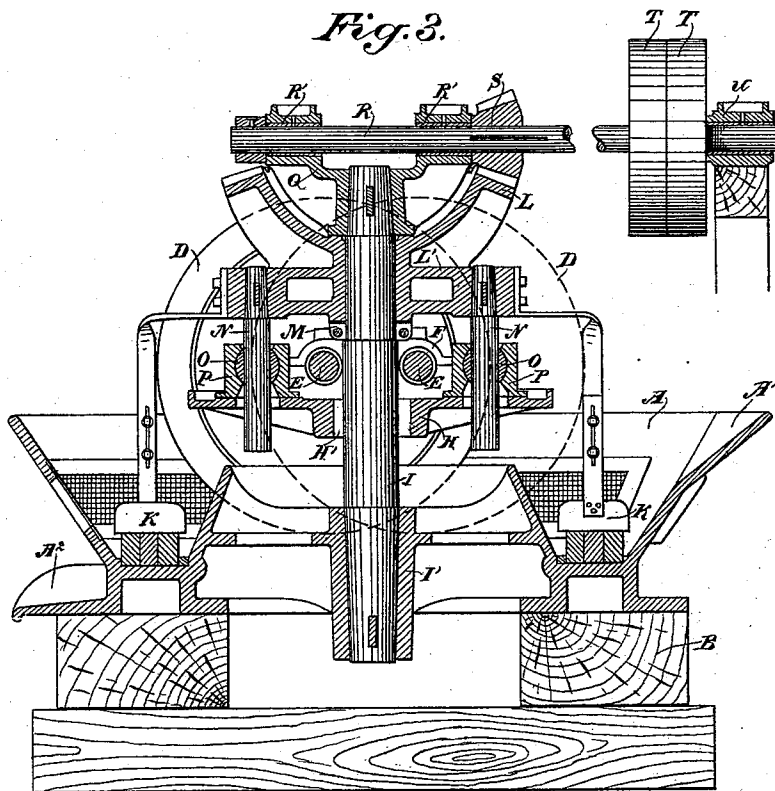
(No Model.)

3 Sheets—Sheet 2.

A. H. SCHIERHOLZ.
ORE CRUSHER.

No. 538,884.

Patented May 7, 1895.



Witnesses,
J. H. Moore
J. F. Aschbeck

Inventor,
August H. Schierholz
By Duway & Co
attys

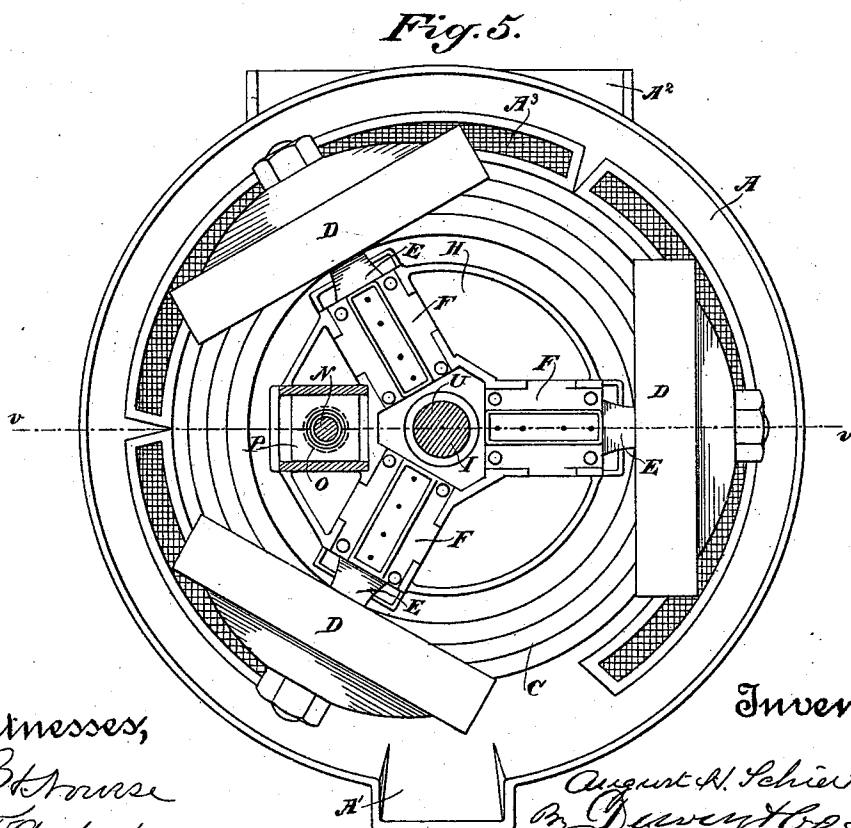
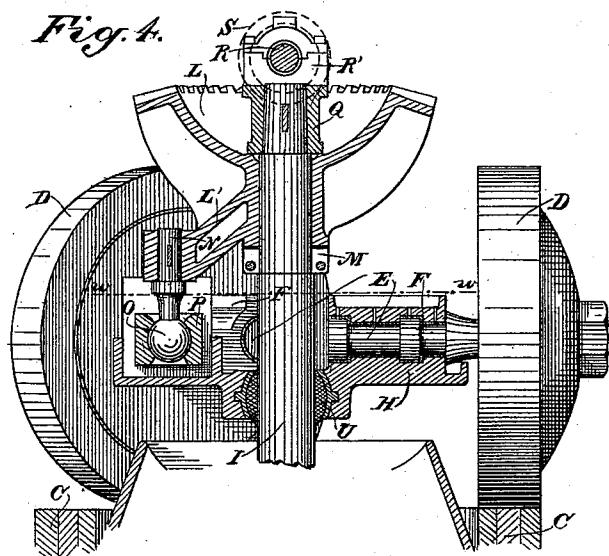
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Witnesses,
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Inventor,

August H. Schierholz
By Dwyer & Co. atty.

UNITED STATES PATENT OFFICE.

AUGUST H. SCHIERHOLZ, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THE
RISDON IRON AND LOCOMOTIVE WORKS, OF SAME PLACE.

ORE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 538,884, dated May 7, 1895.

Application filed February 5, 1895. Serial No. 537,416. (No model.)

To all whom it may concern:

Be it known that I, AUGUST H. SCHIERHOLZ, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Ore-Crushers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in ore crushing machines, and is especially applicable to that class of machines in which crushing rolls are caused to travel within the circumference of a pan upon suitable dies arranged around the periphery, and which have a fixed central post.

My invention consists of the novel means for driving the rolls and allowing for irregularities of movement caused by the ore over which the rolls pass, without interfering with the vertical shaft or its gears and connections.

It also consists in certain details of construction all of which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section taken through the center of the pan and showing, also, a section on the line *zz* of Fig. 2. Fig. 2 is a plan view of the pan and rollers, with horizontal section of the vertical shaft and driving-pins, on line *xx* of Fig. 1. Fig. 3 is a vertical section taken through the line *yy* of Fig. 2. Fig. 4 is a vertical section taken through the line *vv* of Fig. 5, showing a modification of the drivers where three rolls are used. Fig. 5 is a horizontal section of the same on line *ww* of Fig. 4.

The object of my invention is to provide a means intermediate between the driving gear upon the fixed vertical shaft, and the table or carrier upon which the horizontal roller shafts are journaled, by which the rollers are caused to travel upon the dies, this intermediate connection being of such a nature that it will compensate for all irregularities of movement and vertical rise and fall of the rollers as they pass over the material to be crushed, without in any way conveying these motions to the driving mechanism. This makes the mill self containing, all parts being supported from the pan and vertical shaft and resting upon one

foundation, and it also equalizes the wear upon the dies.

A is a circular annular pan, shown in the present case with inclined sides, a feed spout *A'* through which ore is introduced from time to time, screens *A³* through which the pulverized material passes when sufficiently fine, falling into a surrounding annular trough or channel whence it is eventually delivered through a discharge spout *A²*. This pan is fixed upon a suitable supporting foundation B.

Dies C are fixed in the bottom of the pan forming a circular track upon which the rollers D are adapted to travel and these rollers are of such weight that any ore or material to be crushed, falling upon the dies beneath the rollers, will be pulverized.

The rollers are fixed upon shafts E which turn in journal-boxes F G upon a circular supporting table H.

The shafts E are arranged, as shown in my Patent No. 531,068, dated December 18, 1894, upon each side of the vertical driving shaft I, so that the axles or shafts E extend essentially tangentially to the driving shaft instead of radiating therefrom, this position causing a certain amount of draft and grinding action of the rollers upon the dies as they pass around which is more effective in grinding and pulverizing the ore which is being crushed.

The driving mechanism consists of a gear-wheel L turning loosely upon the vertical shaft I, this shaft being stepped and fixed immovably in the hub or center I' at the bottom of the pan.

R is a horizontal driving shaft turning in journal-boxes R' which are fixed upon a table or support Q, this table being firmly keyed to the top of the shaft I. A bevel-pinion S upon this shaft R engages the gear L and causes it to rotate.

The shaft R is driven by power from any suitable source through fast and loose pulleys T T, or other suitable device upon the shaft R, by which the machine may be set in motion or stopped in the usual manner.

If the shaft R is of considerable length an outside journal or bearing-box *u* may be employed to support its outer end, but if set

close to the inner journal-boxes R' this may be dispensed with.

The gear L is made of any suitable shape, and the lower part of it is formed with a frame or carrier L' which projects outwardly from the gear L, or its hub. This gear and disk, turning loosely, as previously described, upon the shaft I, are supported by a collar M resting upon a shoulder turned upon the shaft I, or otherwise supported in such a manner that it may be adjusted to compensate for any wear of the parts.

NN are two stout pins fixed to the carrier L' and projecting downwardly therefrom through openings made in the table H. This table H has a central space or opening H' surrounding the shaft I, and this opening is of sufficient size to allow the table H to tilt to either side whenever the rolls B pass over any material obstruction large enough to cause them to rise. This allows of all the movement of the rollers and table that may be necessary without the table coming into contact with the permanent and stationary shaft I. In order to allow of this movement of the table while at the same time maintaining the connection between the pins N and the table, I have shown universal joints consisting of globular shaped attachments O loosely fitting the pins. These attachments O fit in correspondingly shaped boxes P so that they may turn within these boxes and they fit loosely upon the pins N so that the latter may slide through them if the table H is tilted to either side by irregular masses of ore beneath the rollers D.

The pins N are of such a length as to allow for the wear of the rollers and dies, without affecting their connection with and action upon the ball joints which connect them with the table.

It will be seen from this construction that if either of the rollers should lift up, its shaft E would be correspondingly tilted, and as the shaft is journaled in boxes F and G fixed upon the table H, the latter will also be tilted, the opening H' allowing it to tilt without coming in contact with the shaft I. When this tilting takes place, the driving pin N will slide through the ball O, and the latter will turn correspondingly in its box P, thus yielding to any irregular movement of the rollers, while at the same time continuing the application of power to rotate the table H and cause the rollers to travel around upon the dies.

When two rollers are employed, as shown in Fig. 2, the vertical pins N stand with relation to each other so that a line drawn through their centers would pass through the center of the shaft I but not at right angles with the shafts E, and as the power of these pins is applied to rotate the table H, they will retain the latter essentially in its central position about the shaft I.

KK are scrapers which are adapted to scrape the ore within the pan, as they revolve with relation to the dies, as shown in Fig. 3.

These scrapers have adjustable arms extending upwardly and they are fixed to the disk or carrier L'. As this carrier always maintains a horizontal position and is not affected by the irregular movements of the rollers D, it will be seen that the scrapers can always be adjusted to run at a regular distance from the surface of the dies C and they will not be affected by any irregularities of motion of the rollers or the driving table upon which their shafts are journaled.

In Figs. 4 and 5, I have shown a modification of the device where it is applicable to overhead driven mills of well known patterns now in use, in which an unequal number of crushing rollers are used.

In the present case, I have shown three crushing rollers the shafts of which are journaled upon a table H having a ball joint U upon the central fixed vertical shaft I about which ball joint, the table H is allowed to tilt. In this case, the single driving arm N extends downwardly and outwardly from the gear L which turns upon the upper part of the shaft I, and this pin or shaft N has the ball joint O fitting within a correspondingly shaped box P in the manner previously described. In this case, the oscillations or tilting movements of the frame or table which carries the rollers D are compensated for by allowing the box P a horizontal and a vertical movement in suitable guides or channels.

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

1. In an ore crusher and grinder, a pan having a vertical central fixed shaft, annular dies fixed around the periphery of the pan, and rollers adapted to travel upon said dies, the horizontal shafts of said rollers being journaled in boxes upon a rotary table having a central opening whereby it is kept out of contact with the fixed central shaft, a gear turning loosely around the upper part of the fixed shaft and receiving motion from a horizontal shaft and pinion, boxes in which said horizontal shaft turns, fixed to the upper part of the vertical central shaft, and a mechanism intermediate between the gear-wheel and the revolving table whereby the latter is impelled.

2. In an ore crusher having an annular pan with dies, and means for feeding and discharging, a central fixed shaft, a horizontal table having journal-boxes fixed upon it, rollers adapted to travel upon the dies, the horizontal shafts of which rollers turn in said journal-boxes, an opening made through the center of the table whereby it is kept out of contact with the central shaft, a driving gear supported and turning loosely upon the upper end of the central shaft, and means whereby motion is communicated to rotate it, a carrier or hub upon said gear having vertical pins fixed therein and projecting downwardly upon opposite sides of the central shaft, and ball and socket joints and boxes fixed upon the roller shaft table whereby power is communi-

cated from the gear to drive the table and shafts.

3. In an ore crusher and grinder consisting of an annular pan with peripheral dies, and 5 rollers adapted to travel upon said dies so as to crush material placed thereon, a vertical central fixed shaft having a gear-wheel loosely turnable upon the upper portion above the pan, a horizontal shaft and pinion whereby 10 said gear is turned about the central shaft, vertical pins fixed to the hub of the gear or extension thereof, balls through which said pins are slidable and hemispherical boxes fixed to the central horizontal table so that 15 the pins act to rotate said table, a central opening made in the table around the vertical shaft whereby contact between the two is prevented, and journal-boxes upon the table within which the horizontal shafts of the 20 crushing rollers are journaled.

4. In a rotary crusher having an annular pan and dies, and rollers propelled and traveling upon the dies, a fixed vertical central shaft, journal-boxes fixed and supported

thereon, a horizontal shaft turnable in said 25 boxes and carrying a pinion through which power is transmitted, a gear-wheel turning loosely upon the fixed shaft and engaging the pinion, and mechanism intermediate between the gear and the crushing rollers by which 30 they are driven.

5. In an annular roller crusher, a fixed vertical central shaft, a horizontal driving shaft journaled in boxes fixed to the top of the vertical shaft, a gear-wheel turning loosely upon 35 the vertical shaft, and engaging a pinion upon the horizontal shaft, vertical pins driven by said gear and adapted to engage and drive the roller carrying table or frame, and boxes upon the table with which the pins engage, said 40 engagement being self-adjusting to allow for the wear of the shoes and dies.

In witness whereof I have hereunto set my hand.

AUGUST H. SCHIERHOLZ.

Witnesses:

S. H. NOURSE,
GEO. H. STRONG.