J. W. R. LAXTON.

ORE TREATING MACHINE.

APPLICATION FILED DEC. 31, 1906.

909,429.

Patented Jan. 12, 1909.

2 SHEETS—SHEET 1.

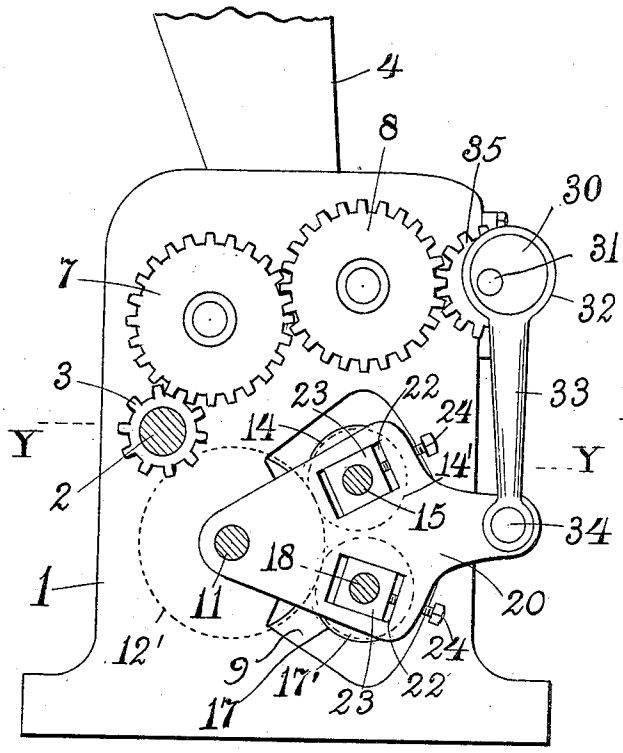


Fig. 1

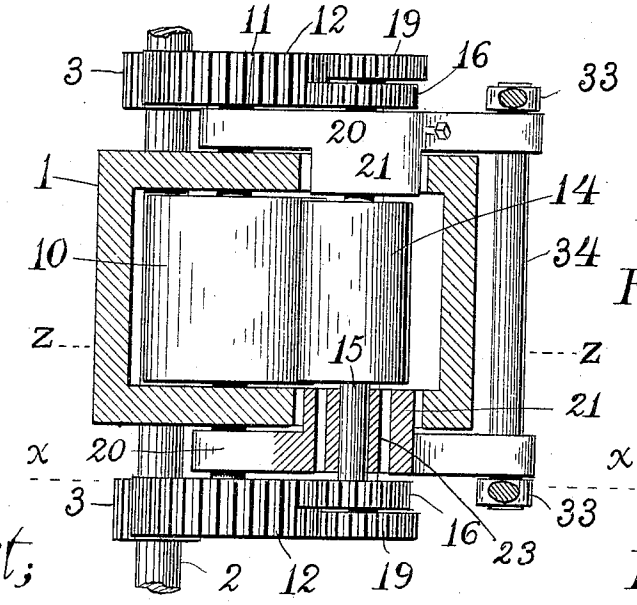


Fig. 2

Attest;

James Browna

John J. MacMahon M.d.

Inventor,

John W. R. Laxton;

By A. B. Upham,

Attorney

THE NORRIS PETERS CO., WASHINGTON, D. C.

J. W. R. LAXTON.

ORE TREATING MACHINE.

APPLICATION FILED DEC. 31, 1906.

909,429.

Patented Jan. 12, 1909.

2 SHEETS—SHEET 2.

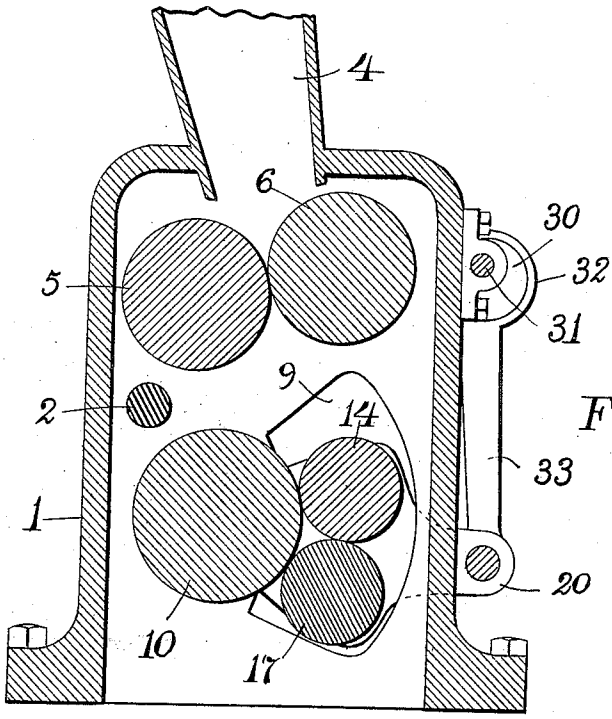


Fig. 3

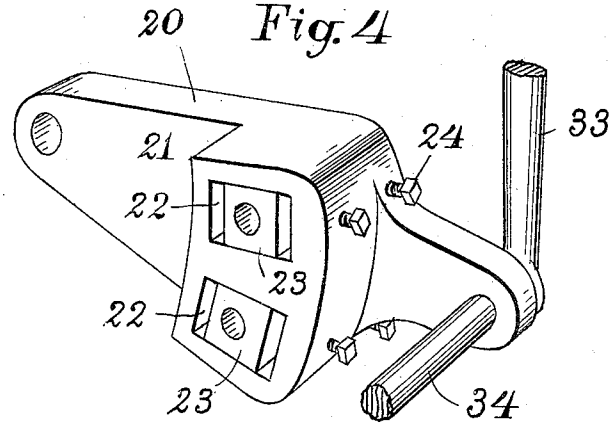


Fig. 4

Attest;

James B. Brown

John J. MacMahon M.D.

Inventor,

John W. R. Laxton,

By A. B. Graham,

Attorney

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN W. R. LAXTON, OF LYNN, MASSACHUSETTS.

ORE-TREATING MACHINE.

No. 909,429. Specification of Letters Patent. Patented Jan. 12, 1909.

Application filed December 31, 1906. Serial No. 350,244.

To all whom it may concern:

Be it known that I, JOHN W. R. LAXTON, a citizen of the United States, and a resident of Lynn, in the county of Essex and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Ore-Treating Machines, of which the following is a full, clear, and exact description.

The object of this invention is the construction of an ore crushing and polishing machine wherein the polishing members are given a differential motion with respect to the crushing roll, and particularly one wherein the polishing members are alternately moved more slowly and then more rapidly than the crushing roll, for the purpose of more thoroughly effecting the treatment of the ore.

Referring to the drawings forming part of this specification, Figure 1 is a side sectional elevation on the line X—X in Fig. 2. Fig. 2 is a horizontal section on the line Y—Y in Fig. 1. Fig. 3 is a vertical sectional elevation on the line Z—Z in Fig. 2. Fig. 4 is a perspective view of one of the oscillatory carriers for the polishing rolls.

The case or frame 1 of this machine is preferably of cast iron, and within it are the crushing rolls 5 and 6 and the polishing rolls 10, 14 and 17. In the sides of this case are the bearings for the shafts carrying these rolls, and exterior thereto are the gears for the operation of the rolls.

The main driving shaft 2 has fixed thereon two pinions 3 meshing with the gears 7 and 12,—each pinion with two gears, as shown in Figs. 1 and 2. The gears 7 are rigid with the roll 5, one at each end of the shaft thereof, and of course rotate the same. In addition, said gears mesh with the gears 8 and so turn the roll 6.

The main polishing roll 10 is fixed upon the shaft 11 and is hence rotated with the gears 12. Coacting with this main roll are two oscillating rolls 14, 17, each having two gears 16, 19 meshing with the gears 12 for their operation. To oscillate these rolls 14, 17, their shafts 15, 18 are given bearings in the oscillating arms 20 pivotally supported at one end of each by the shaft 11, the free ends of said arms being given the desired vertical oscillation through the medium of the pitmen 33, eccentrics 30, shaft 31 and gears 35 meshing with the gears 8; the upper ends of said pitmen being connected with or formed with eccentric straps 32 encircling said eccentrics. It is preferable to unite the free ends of said arms by means of a cross rod 34, which also serves as a convenient pivot for said pitmen rods.

The bearing boxes 23 for the shafts 15, 18 of the rolls 14, 17 are made slidable in the openings 22, formed in said arms 20; adjusting screws 24 being provided for forcing said boxes and hence the rolls toward the main roll 10. To bring the bearings close to the rolls 14, 17, the portion of each arm 20 immediately surrounding said boxes is laterally extended, as at 21 in Figs. 2 and 4, said boxes being equally prolonged.

As shown more fully at 9 in Fig. 3, the sides of the case 1 are cut through sufficiently to make room for the lateral extensions 21 during the oscillations of said arms and the rolls carried thereby.

The roll 10 having a slightly less angular velocity than rolls 5, 6, and the gears 35 being still more rapidly rotated, the speed of the downward swing of the rolls 14, 17 will be substantially equal to the movement of the roll 10. Consequently during this downward swing, there will be substantially no emission of the pulverized ore from between the roll 14 and the main roll 10, nor from between the roll 17 and the main roll; but the crushed ore descending from between the crushing rolls 5, 6 will accumulate to a slight extent between the roll 14 and the main roll 10. As the arms 20 swing upward, however, the slight accumulation is fed through between the oscillating roll and the main roll, and the pulverizing and polishing action accomplished. By employing two oscillating rolls, the pulverized and partially polished ore from the upper roll 14 is given a finer pulverizing and a final polishing by the lower roll 17. To aid in the polishing action of these rolls, the diameters of the rolls 14, 17 are made slightly in excess of the pitch lines of the gears 16, 19, and the diameter of the main roll 10 is made slightly less than the pitch line of its gears 12, as shown in Fig. 1 where the dotted lines 12′ represents the pitch line of the gears 12 and the dotted lines 14′, 17′ the pitch lines of the gears 14, 17. Thus made, the superficial speed of the main roll 10 is slightly less than the superficial speed of the oscillating rolls; and consequently, there is a constant rubbing action upon the pulverized ore passing between the main roll and the oscillating rolls. When, however, the arms 20 are swinging down-

ward this rubbing action is considerably increased, and during the upward swing, equally reduced. Hence, at the moments when there is a reduced passage of the pulverized ore, there is an increased rubbing action upon the same and a more thorough polishing upon whatever ore passes through. Another advantage of this arrangement is that not only is the pulverized ore again more thoroughly pulverized and polished by the lower roll 17, but the once-polished ore in its descent from the upper to the lower roll is received by the latter at a different angle and an intermixed condition, and particles which in the first instance escaped sufficient polishing are sure to receive the desired treatment in the action of the lower roll with the main roll. This is seen more clearly when it is noted that the oscillation of the oscillating rolls causes the fine sheet of ore-powder descending from between the upper and main rolls to be distributed upon differing portions of the lower roll's periphery, and so gives the intermixing and redistribution needed for the purpose.

What I claim as my invention and for which I desire Letters Patent is as follows, to wit;—

1. An ore polishing device comprising a main roll, means for rotating it, a plurality of rolls contacting with the first-named roll, and means for oscillating said rolls in an arc concentric with the first-named roll.

2. The combination with an ore crushing machine, of a large roll positively rotated, and two smaller rolls located in contact with the large roll one above the other and rotated at a speed of different superficial velocity from that of the large roll; the juncture of the large and small rolls being directly below the delivery of said crushing machine.

3. In an ore crushing machine, the combination with crushing means, of an ore polishing device comprising a uniformly rotated main roll, and a plurality of oscillating rolls contacting with the latter.

4. An ore pulverizing and polishing device comprising a uniformly rotating main roll having a projecting shaft, members pivoted upon the ends of said shaft, means for oscillating said members on such shaft, and a plurality of rolls carried by said members in contact with said main roll and forcibly rotated therewith.

5. An ore pulverizing and polishing device comprising a uniformly rotated main roll, members pivoted concentric with said roll, means for oscillating said members, and a plurality of rolls carried by said members in contact with said main roll and rotated therewith; said main roll having a slightly different superficial velocity as compared with the last named rolls.

6. An ore crushing and polishing machine comprising a driving shaft and pinions thereon, crushing rolls having gears meshing with said pinions, a main polishing roll having gears meshing with said pinions, arms pivoted concentric with said main polishing roll, a plurality of rolls carried by said arms in contact with the main polishing roll, a cross rod uniting the free ends of said arms, pitmen connected to said cross-rod, eccentrics actuating said pitmen, and gears rigid with said eccentrics and meshing with the first named gears.

7. The combination with the main roll and its shaft uniformly rotated, of arms pivoted on said shaft and formed with lateral extensions, a case supporting said shaft and having lateral openings loosely receiving said extensions, bearing boxes adjustably held by said arms and extensions, rolls having shafts located in said boxes and having their peripheries in contact with said main roll, means for forcibly rotating said main and last named rolls, and means for vertically oscillating said arms.

In testimony that I claim the foregoing invention, I have hereunto set my hand this 27th day of December, 1906.

JOHN W. R. LAXTON.

Witnesses:

JAMES BROWN,

JOHN J. MACMAHON.