F. W. ROEBBEL.

ROCK AND CLAY PULVERIZER.

APPLICATION FILED APR. 17, 1911.

1,015,344.

Patented Jan. 23, 1912.

2 SHEETS—SHEET 1.

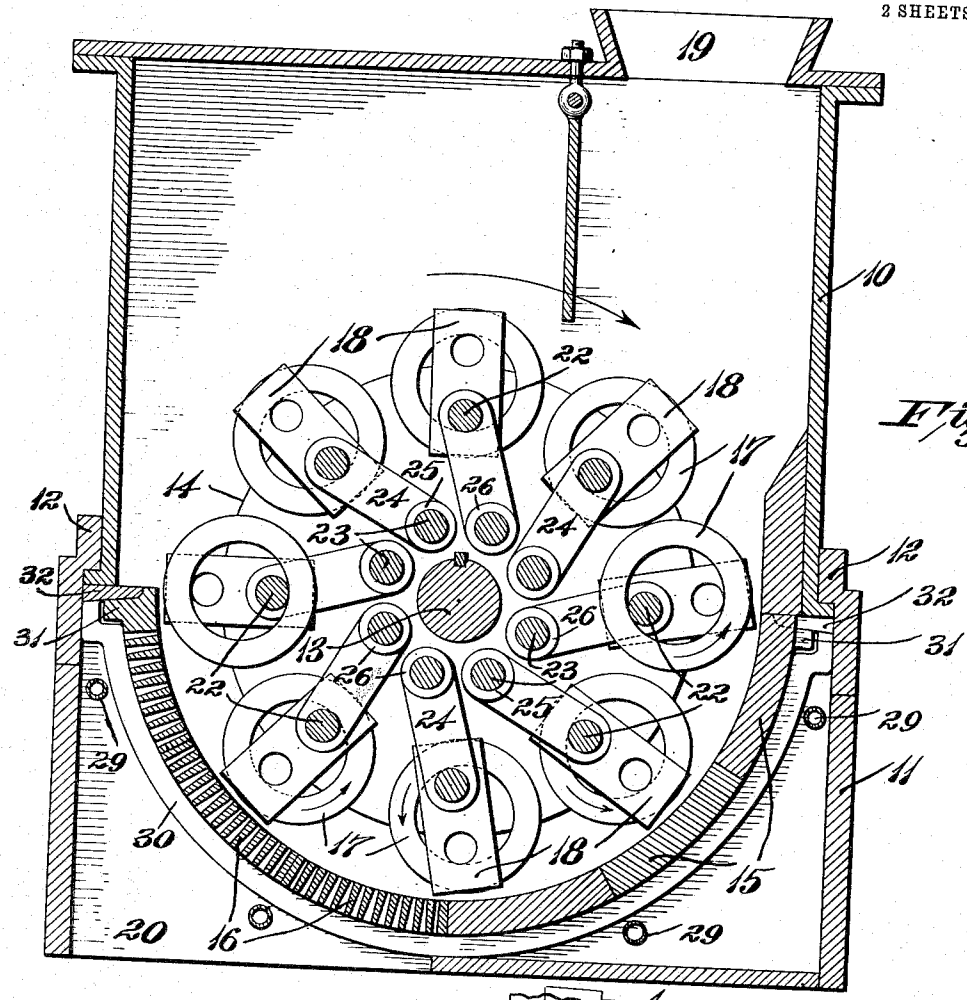

Fig. 1.

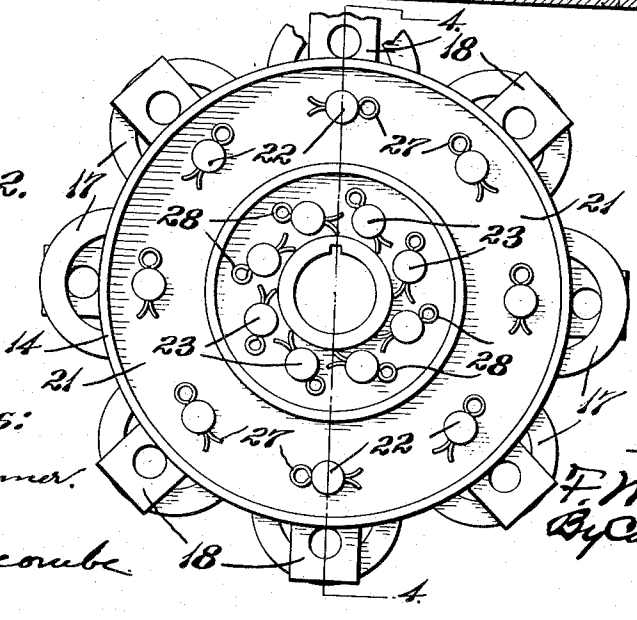

Fig. 2.

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Fig. 3.

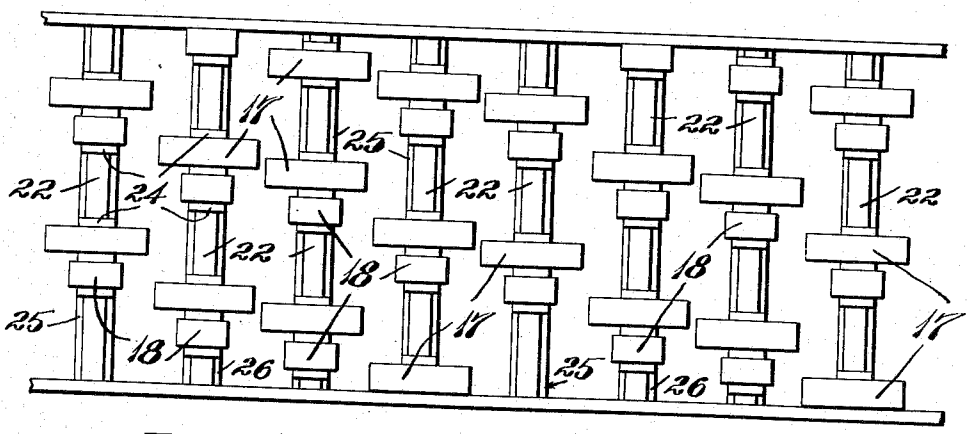


Fig. 4.

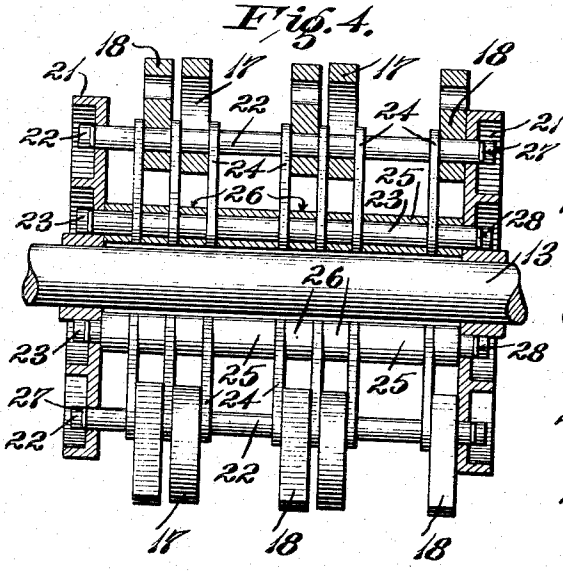


Fig. 5.

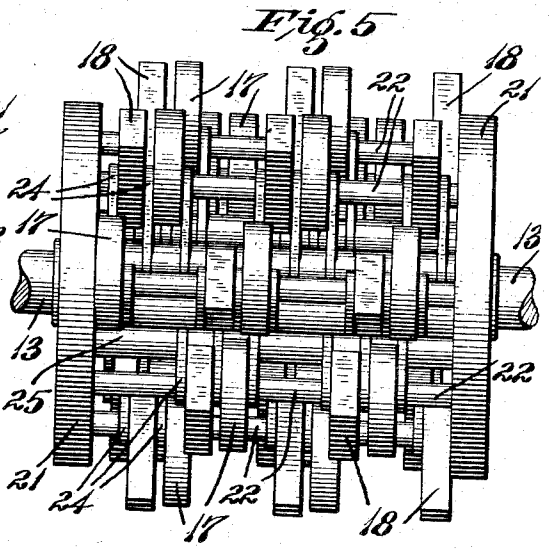
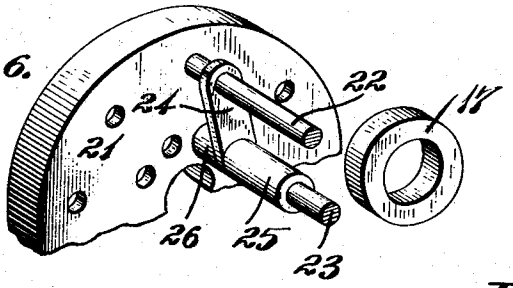


Fig. 6.



Witnesses:

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UNITED STATES PATENT OFFICE.

FREDERIC W. ROEBBEL, OF ST. LOUIS, MISSOURI, ASSIGNOR TO AMERICAN PULVERIZER COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

ROCK AND CLAY PULVERIZER.

1,015,344. Specification of Letters Patent. Patented Jan. 23, 1912.

Application filed April 17, 1911. Serial No. 621,645.

To all whom it may concern:

Be it known that I, FREDERIC W. ROEBBEL, a citizen of the United States, and a resident of the city of St. Louis and State of Missouri, have invented a new and useful Improvement in Rock and Clay Pulverizers, of which the following is a specification.

My invention relates to pulverizing machines of the type in which a series of rings and hammers are rotatably supported within a casing, and comprises improvements in the rotor, or revolving part carrying the rings and hammers, and in the arrangement of the grinding concaves and grate bars, as hereinafter more particularly pointed out in the claims.

In the drawing accompanying this application and forming a part thereof,—Figure 1 is a vertical transverse section through a pulverizer embodying my invention, showing the rings and hammers in the position which they occupy with the parts in rotation in the direction of the arrow; Fig. 2 is an end elevation of the rotor; Fig. 3 is a diagrammatic view showing the development of the periphery of the rotor and rings and hammers mounted thereon; Fig. 4 is a longitudinal section through the rotor on the line 4—4 of Fig. 2; Fig. 5 is a side elevation of the rotor showing the hammers and rings in position thereon; and Fig. 6 is an isometric view of part of the end disk of the rotor showing the arrangement of supporting bars, links and separators for the rings and hammers.

The pulverizer illustrated in the drawings comprises an upper casing 10 and a lower casing 11 having removable sections 12 for clamping them together. The end walls of the lower casing are provided with bearings for rotatably supporting the ends of the shaft 13 of the rotor 14. The casing 11 supports the grinding concaves 15 and grate bars 16 in close proximity to the paths of the outermost portions of the grinding rings 17 and hammers 18 carried by the rotor.

The end walls of the lower casing are secured together by rods 29 extending from one wall to the other within the casing below the grinding concaves. Each end wall is provided with a flange 30, upon which flanges the ends of the grate bars and grinding concaves are supported. These latter are carefully fitted together along their meeting edges, and securely held in place in the casing by means of wedge or filler blocks 32 bearing on the lugs 31 at the extremities of the upper grinding concaves. These wedge blocks admit of very accurate adjustment, thus insuring that the grinding concaves are rigidly secured in the casing without play or looseness. These wedges may be withdrawn by removing the casing sections 12, thus enabling the grate bars and grinding concaves to be changed. The upper casing 10 has a chute or hopper 19 through which the material to be pulverized is fed and the lower casing section 11 is provided with an orifice 20 under-lying the grate bars, through which the pulverized material is discharged after its passage through the mill.

The rotor 14 comprises disks or end frames 21 mounted on the shaft 13 adjacent its end journals. These disks are keyed or otherwise rigidly secured to the shaft and are connected to each other by means of two series of parallel rods 22 and 23, the rods of each series being equally distant radially from the shaft 13 and equally spaced angularly around the same. There are an equal number of rods in each series, in this case eight. Each rod in the outer series is connected at several points along its length to a rod in the inner series which inner rod is not in the same radial plane as the outer rod, but in a plane angularly displaced with respect to it in the direction of rotation of the rotor, this connection being made by links 24.

Arranged on the inner series of rods 23 are tubular separators or sleeves 25 and 26 serving to space the links 24 along the rods. The rings 17 and the reversible hammers 18 are arranged on the outer series of rods 22 in sets, being spaced upon these rods by the links 24. The relative lengths and arrangement of the separators 25 and 26 is such that the connecting links and the sets of rings and hammers are spirally arranged around the periphery of the rotor as shown in Fig. 3. This spiral arrangement may be such that consecutive rings and hammers will overlap each other and thus there will be no break in the continuity of the grinding action across the face of the grinding concaves as the rings and hammers successively pass by.

Each rod 23 is slightly angularly displaced in the direction of rotation of the rotor with respect to its mating rod 22 for the purpose of causing the links 24 to lie along the line of resultant thrust upon the rods 22 due to the radial centrifugal force of the rings and the tangential force caused by the impact of the rings against the material to be pulverized. The provision of the inner series of rods and bracing links greatly stiffens the rotor and provides a rigid support for the outer series of rods against any deflection in the direction in which the pull on them is greatest, and enables comparatively small rods to be used, resulting in a light rotor having great strength.

The rods 22 and 23 are secured in the disks 21 by means of cotter-pins 27 and 28 passed through their extremities, and lying in annular grooves on the outer sides of the disks. This arrangement permits of the easy removal of the rods 22 when necessary to replace worn or broken hammers and rings without the entire disassembling of the rotor and even without removing the rotor from the casing, as the latter may be provided with an opening in one or both of its ends through which the pins 27 and rods 22 may be removed. Another advantage of this construction of stiffening rods and links with separators is that it is possible, by varying the lengths of the separators, to adjust the rings and hammers individually, so that a hammer may follow immediately behind a ring, for example, which is highly desirable in order to enable the machine to be adapted to grinding various materials.

It is evident that my machine is not limited to the use of hammers and rings of the kinds shown, but any shape of hammer desired may be substituted for any or all of the hammers and rings shown. It is also apparent that the number of hammers or rings on each rod may be increased or diminished, and that the lengths of the rods may be varied to adapt the rotor to machines of varying width.

What I claim and desire to secure by Letters Patent is:

1. In a rotor for pulverizing machines, a main shaft, frame members directly mounted on said shaft, a series of rods extending lengthwise of said shaft and secured in said frame members, hammers carried thereby, and braces carried by said frame members and attached to said rods at spaced intervals to secure the latter against deflection.

2. A rotor for a pulverizing machine comprising a main shaft, parallel end frames mounted thereon and connected by two circular series of rods fixed at both ends and out of radial line from the shaft, hammers carried by the outer series of rods and spaced links rigidly connecting the rods of the outer series with the rods of the inner series.

3. In a pulverizing machine, a casing carrying grinding concaves, and a rotor mounted in said casing, hammers carried thereby adapted to coöperate with said grinding concaves, said rotor comprising a shaft, end frames mounted thereon and spaced apart, hammer supporting rods fixed at both ends in said end frames, and spacing means for the hammers, said spacing means serving also as a bracing means for said hammer supporting rods.

4. In a pulverizing machine, a casing carrying grinding concaves, a rotor mounted in said casing, hammers carried thereby adapted to coöperate with said grinding concaves, said rotor comprising a shaft, end frames mounted thereon and spaced apart, hammer supporting rods arranged in said end frames, and spacing means for the hammers removable independently thereof.

5. A rotor for a pulverizing machine comprising parallel disks mounted for rotation and connected by two series of rods arranged in concentric circles about the axis of rotation, hammers carried by the outer series of rods and spaced links connecting the rods of the outer series with the rods of the inner series, the rods of the inner series being out of radial line with the rods of the outer series.

6. A pulverizing machine comprising a casing carrying grinding surfaces and a rotor rotatably mounted therein, rings and hammers carried by said rotor adapted to coöperate with said grinding surfaces, the hammers being arranged to follow immediately behind the rings in their motion past the grinding surfaces, and laterally adjustable with respect to each other.

Signed at St. Louis, Missouri, this 13th day of April, 1911.

FREDERIC W. ROEBBEL.

Witnesses:
A. M. HOLCOMBE,
M. A. SHELTON.