C. WALLACE.

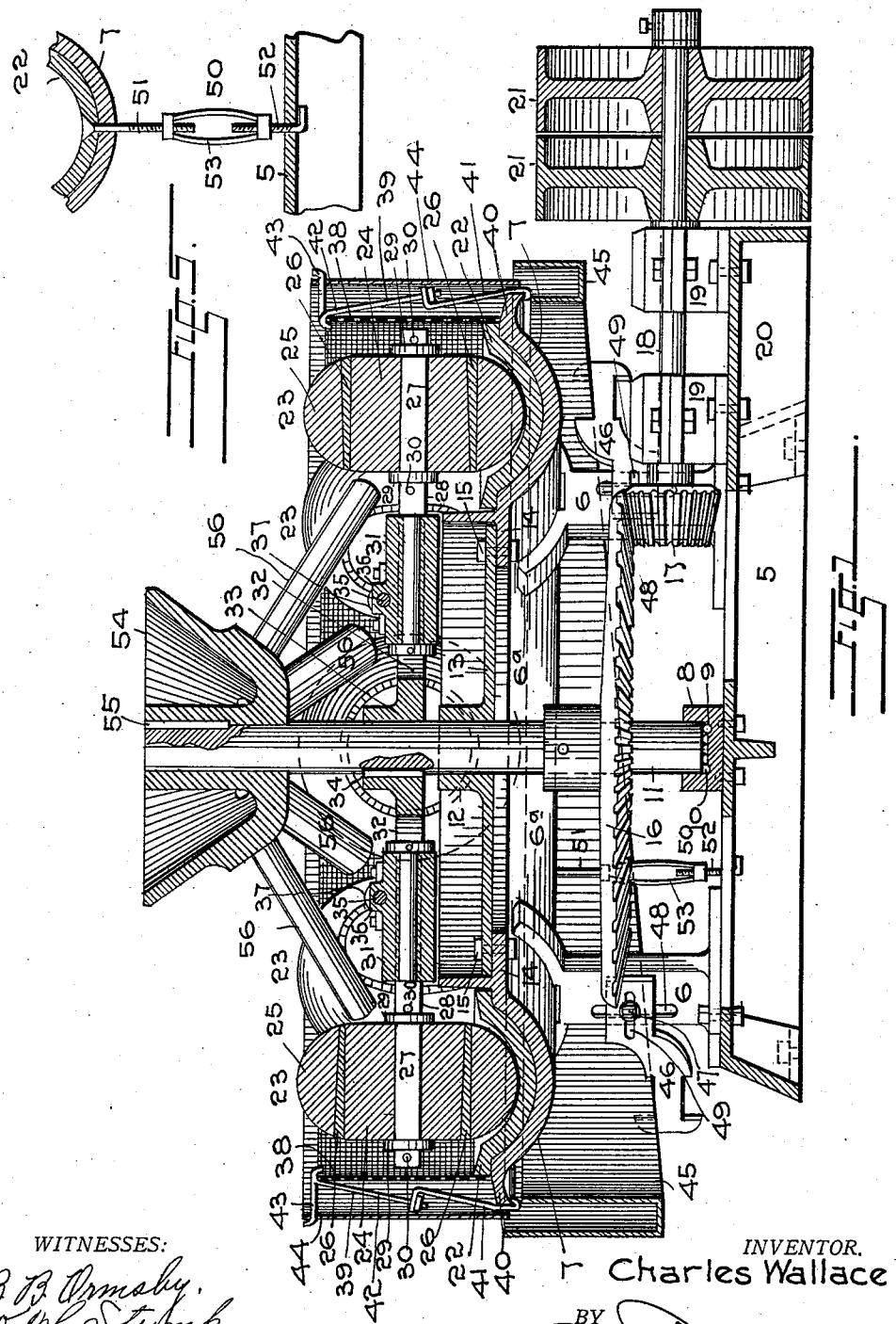
QUARTZ MILL.

APPLICATION FILED JULY 27, 1906.

1,014,273.

Patented Jan. 9, 1912.

2 SHEETS—SHEET 1.



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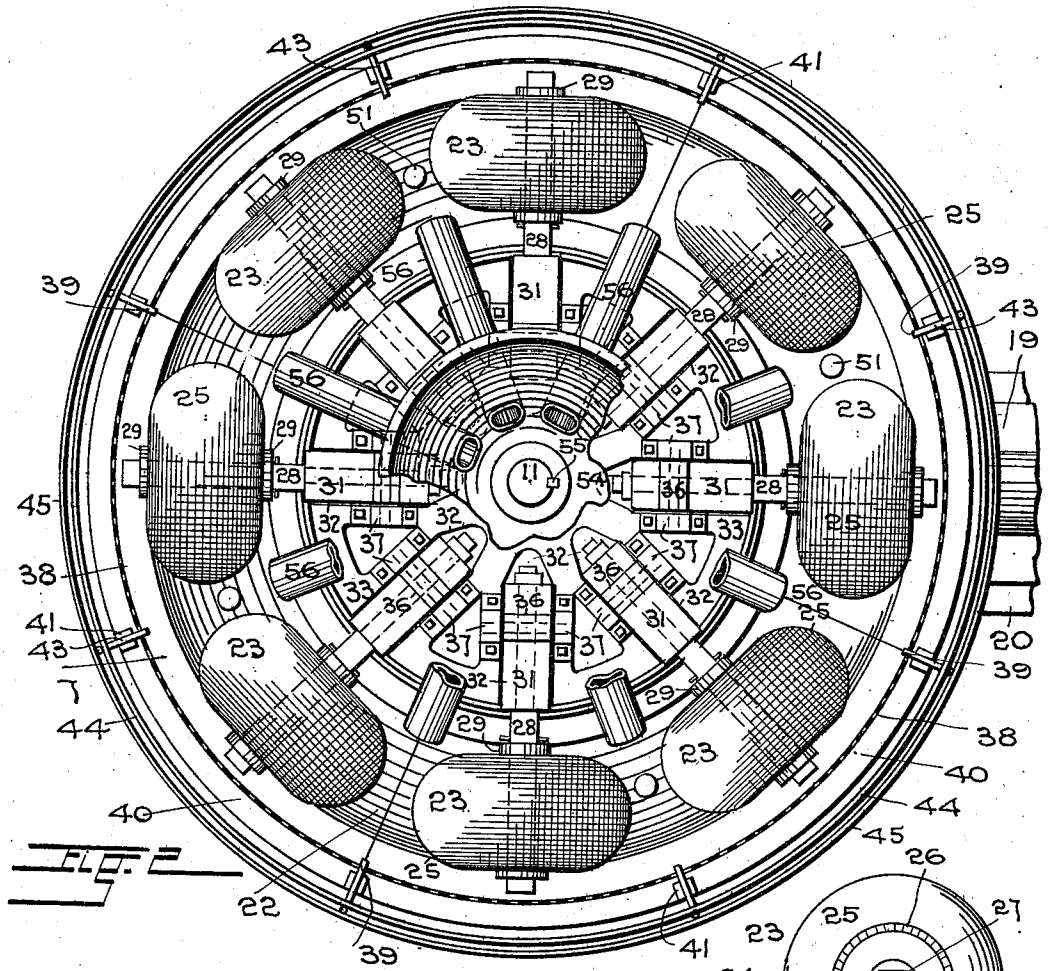

FIG. 2

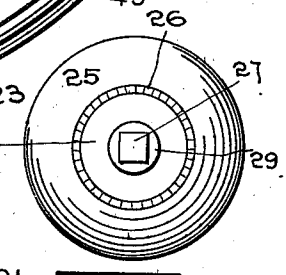

FIG. 4

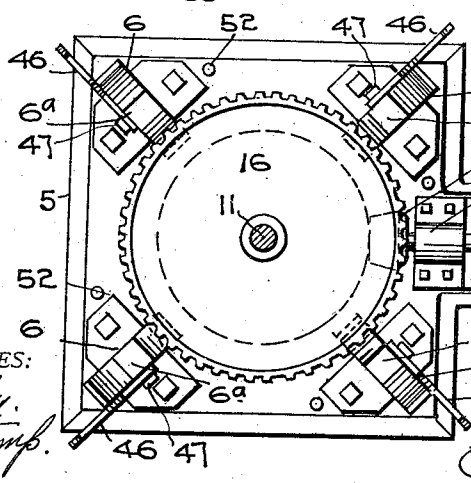

FIG. 3

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UNITED STATES PATENT OFFICE.

CHARLES WALLACE, OF DENVER, COLORADO, ASSIGNOR TO THE WALLACE-OWINGS MACHINERY AND SUPPLY COMPANY.

QUARTZ-MILL.

1,014,273. Specification of Letters Patent. Patented Jan. 9, 1912.

Application filed July 27, 1906. Serial No. 328,037.

To all whom it may concern:

Be it known that I, CHARLES WALLACE, a citizen of the United States of America, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Quartz-Mills, of which the following is a specification.

This invention relates to quartz mills and more particularly to improvements in the so-called roller-mills, in which a plurality of crushing members move circularly in an annular mortar.

The objects of my invention are to produce a mill of the class named which combines simplicity of construction and operation with superior efficiency and capacity; which will yield a product of uniform size or even fineness suitable for concentration or amalgamation and which having great screening surface, will deliver the crushed matter evenly and rapidly. I attain these objects by the mechanism illustrated in the accompanying drawings in the various views of which like parts are similarly designated and in which,

Figure 1— represents a central vertical section through the device, Fig. 2— a plan view thereof, Fig. 3— plan view, drawn to a reduced scale, of the base and thereto secured members of the structure, Fig. 4— a face view of one of the crushing elements employed in the device, and Fig. 5— a fragmentary vertical section through the mortar and the base to show the application of the stay-rods employed to hold the mortar against displacement.

Referring to the drawings, 5 designates a preferably metal base which, in practice, is mounted upon timbers or other suitable foundation. Securely fastened upon the base by bolts or analogous means are four standards or chairs 6, the upper extremities 6^a of which are shaped to form arcuated seats to support the correspondingly shaped annular trough 7 which constitutes the mortar of the device. Base 5 is furthermore provided with a centrally disposed step-box 8 having an annular race 9, the balls 10 in which support a driving shaft 11 which extends vertically through a sleeve 12 forming part of a circular spider 13, the circumferential rim of which is firmly secured to an inwardly extending flange 14 on trough 7, by means of bolts 15.

Secured to shaft 11, subjacent the mortar, is the gear wheel 16 into which meshes a pinion 17 mounted at the inner extremity of a shaft 18 which is horizontally supported in journal boxes 19, upon an extension 20 of the base. Pulleys 21 on shaft 18 are instrumental in conveying a rotary movement thereto from any convenient source of power.

The annular trough 7 is provided with a steel lining or wearing plate 22, the upper concave surface of which constitutes a runway for the crushing rollers 23 and which, to facilitate removal, is preferably composed of a plurality of adjoining sections. Rollers 23, by which the material fed into the lined trough, is comminuted, consist of a slightly conical core 24 surrounded by a preferably steel tire or circular shoe 25, which is firmly held thereon by a plurality of adjoining wooden wedges 26, driven into the annular space, between the two. Tires 25 being plano-convex in cross section, have a curved tread which in practice engages the inner concave surface of the lining 22 of the mortar. Each core 24 is, by collars 29 and pins 30 secured upon the square portion 27 of a normally horizontal axle 28, the inner cylindrical extremity of which is rotatably mounted in a box 31. Boxes 31 are disposed longitudinally, in radially extending equidistant slots 32 in a circular bearing plate 33 which is firmly secured around shaft 11 by means of a feather 34.

Each box is pivotally supported by means of a pin 35, which projects through a superposed lug 36, in boxes 37 oppositely located upon plate 33 along the sides of each slot. This arrangement assures constant contact of the circumferential surface of the rollers with the concave surface of the mortar and greatly aids in the speedy reduction of the quartz by adding the force of gravity of each roller to the crushing effect attained by their rotary, circular motion.

The lining 22 in trough 7 is, in practice, surrounded by a circular, vertically extending screen 38 through which the comminuted ore is discharged and which is held in place by means of a plurality of clamps 39 extending between its upper edge and the circumferential rim 40 on trough 7. Clamps 39 are composed of a hook 41, the lower extremity of which is bent to engage the lower edge of rim 40, while its upper end is adjustably secured to a hook bolt 42, the

upper extremity of which curves over the upper edge of the screen. Bolts 42 are furthermore provided at their upper extremities with, in practice, outwardly extending arms 43, from the curved outer ends of which depends a cylindrical sheet metal fender 44, which being spaced from and surrounding the screen 38, prevents splashing of the water and material emitted therethrough and directs it into the subjacent annular discharge trough 45 which surrounds the mortar and conveys the crushed material to the concentrator. Trough 45, the bottom of which is inclined to accelerate the discharge, is supported upon reversible brackets 46, which, extending laterally from standards 6, are secured thereto by means of bolts 47 projecting through vertical slots 48 in the standard and substantially horizontal slots 49 in the brackets. The brackets are provided with opposite seats in the upper and lower edges of their outer extremity either of which is adapted to hold the trough and which, together with the arrangements of the above named slots, afford means for horizontal and vertical adjustment of the discharge trough to suit varying circumstances and conditions.

The mortar and lining is held against circular displacement by a plurality of staybolts 50, the two members 51 and 52 of which are respectively secured to the mortar and the base and connected by means of a turn-buckle 53.

To confine the material under treatment in the mortar, trough 11 is provided with a circular rim 57 which extending upwardly from the before mentioned flange 14, surrounds the concave plate 22.

The material to be crushed is fed into the mortar through instrumentality of an inverted cone shaped hopper 54, which surrounding the upper extremity of shaft 11, is secured thereto by a key 55, and which is provided with a plurality of radially and downwardly ranging feed pipes 56, alternating with the crushing rollers 23 in proximity to which they terminate.

Having thus described the mechanical construction of the device, its operation and the advantages derived therefrom, will be readily understood.

The material to be crushed is, as hereabove described, fed into the hopper 44 from where it passes through the feed-pipes 56, to be deposited upon the concave plate 22 between the rollers. The arrangement of the feed pipes together with the rotary movement of the hopper, assures an even distribution of the material in the mortar where it comes in immediate contact with the grinding rollers which by their weight and rotary movement, reduce it to a size suitable for concentration or, if so required, to a fineness adapted for amalgamation. By action of the rollers each of which has a rotation on its horizontal axis and also a rotation around the common vertical axis, the comminuted ore and the water with which the mortar is supplied through the feed hopper, are constantly thrown against the screen through which the smaller particles pass to fall into the circular discharge trough while, the larger pieces fall back into the concave mortar, in the path of the rollers, to be reground until reduced to the required size.

It will be readily understood that a most uniform product is thus obtained and that the fineness thereof is determined by the mesh of the surrounding screen, which being continuous immediately discharges the comminuted quartz when reduced to the required size.

I claim—

1. In a quartz mill, in combination, an annular concave mortar, a plurality of circumferentially convex crushing members having a circular and rotary movement therein, a continuous screen surrounding the mortar, a continuous fender surrounding the screen and a plurality of longitudinally extendable clamps connecting the upper edge of the screen with the circumferential rim of the mortar, and adapted to support the said fender.

2. In a quartz mill in combination, an annular concave mortar, a plurality of crushing members having a circular and rotary movement therein, a continuous perpendicular screen surrounding the mortar, a continuous fender surrounding the said screen and spaced therefrom, and a discharge trough separately and vertically adjustably supported subjacent the outlet between said screen and fender, the said screen and the said fender extending from a point below the edge of the said mortar to terminate in a plane above the said crushing members.

In testimony whereof I have affixed my signature in presence of two witnesses.

CHARLES WALLACE.

Witnesses:
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