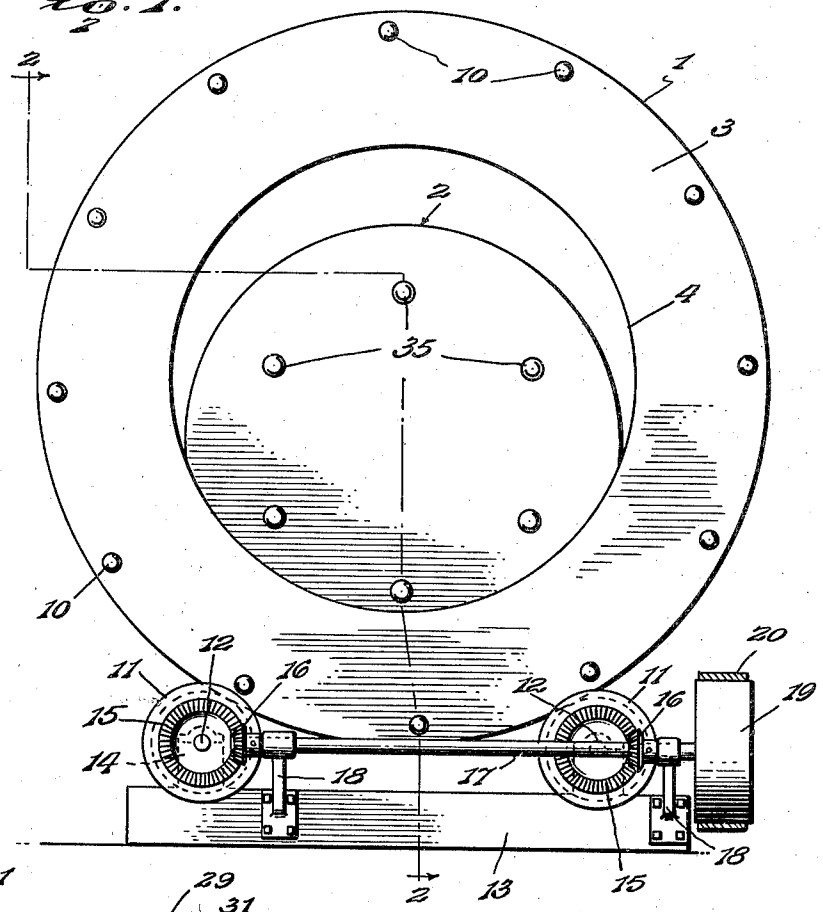
Aug. 9, 1938. F. L. MINNICK 2,126,406

QUARTZ MILL

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Fig. 1.



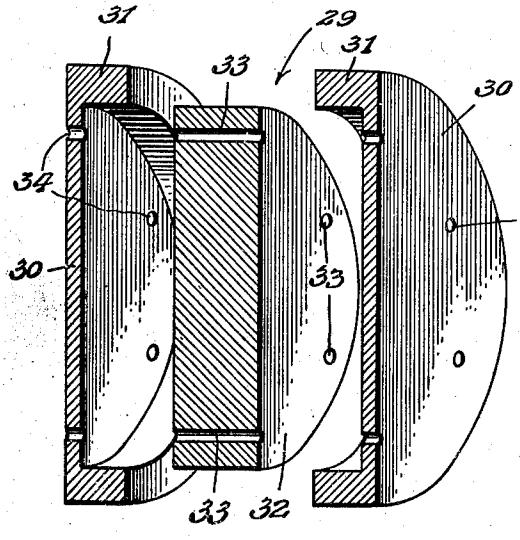




Fig. 5.

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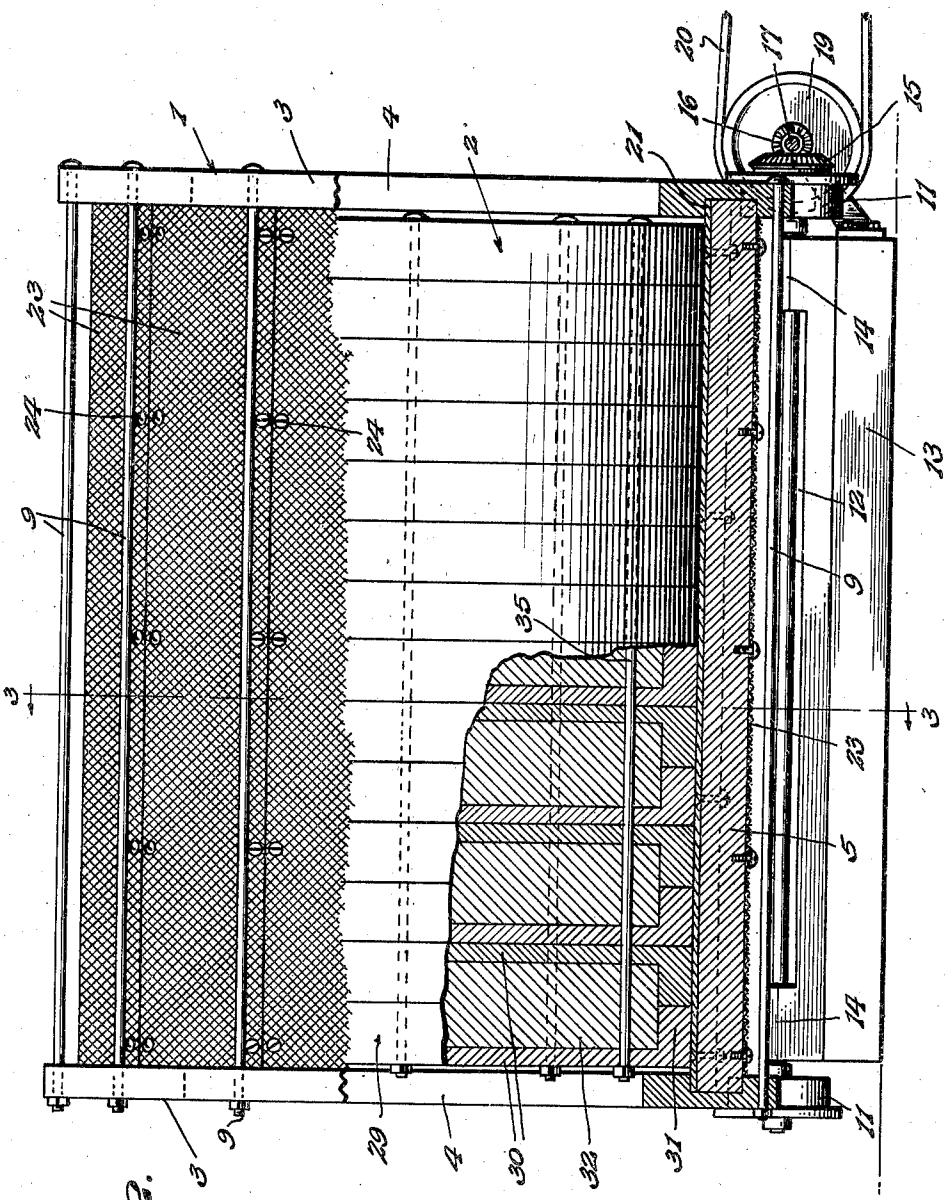



Fig. 2.

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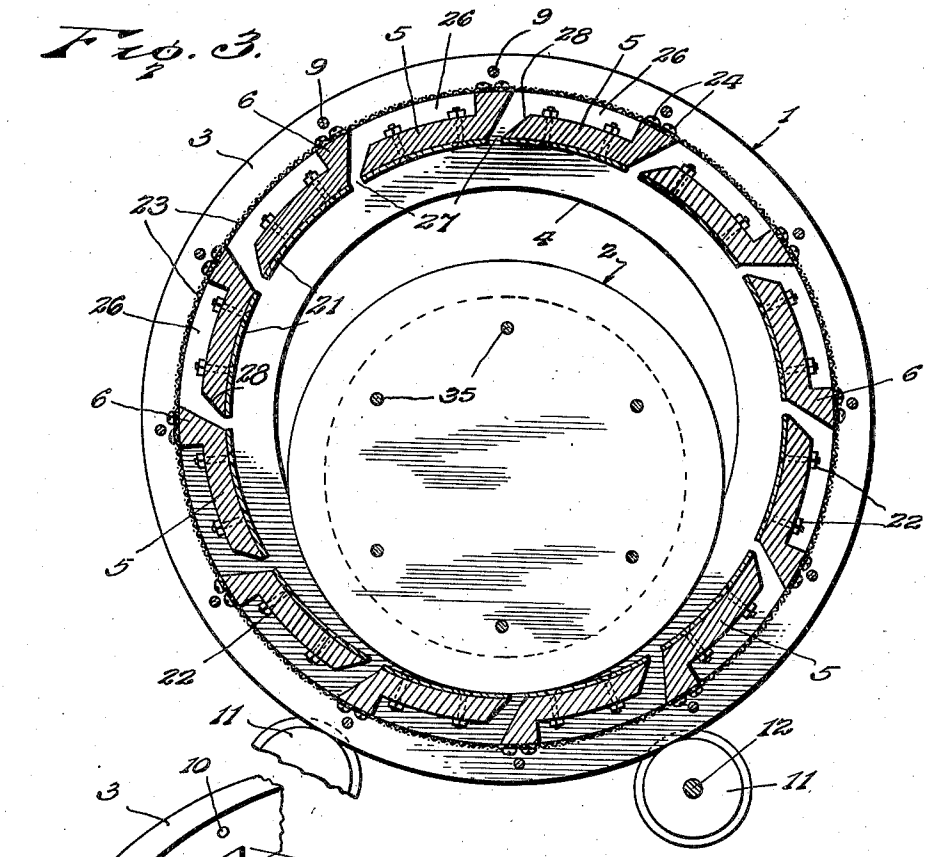
By Lacey & Lacey, Attorneys

Aug. 9, 1938. F. L. MINNICK 2,126,406

QUARTZ MILL

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Fig. 3.



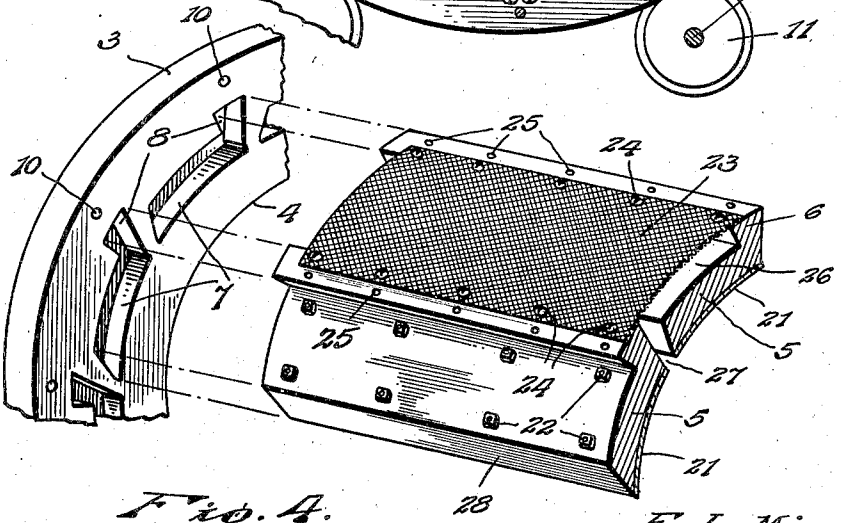




Fig. 4.

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# UNITED STATES PATENT OFFICE

2,126,406

## QUARTZ MILL

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Application May 22, 1936, Serial No. 81,331

1 Claim. (Cl. 83—9)

This invention relates to an improved quartz mill of the rotary drum type and one object of the invention is to provide the mill with a drum so constructed that, as it rotates, ore will be crushed in the drum by a rotatable weight loosely mounted in the drum and ground material retained in the drum until reduced to grains of sufficient fineness to pass through a screen of predetermined mesh.

Another object of the invention is to so construct the drum that the annular wall of the drum will be formed of a plurality of sections mounted between hoods of the drum and so constructed that they not only cooperate with the crushing roller within the drum to reduce the ore to a fine mass but also serve as screen carriers.

Another object of the invention is to so form the sections of the annular wall of the drum that they provide pockets into which the ground quartz passes in order to reach the screen and in which they will be carried upwardly about the drum if too large to pass through the screen and again deposited in position for recrushing by the roller.

Another object of the invention is to so mount the plates forming the annular wall that they will be securely held in proper engagement with heads of the drum but permitted to be removed when repairs are necessary and also permit the drum to be taken apart during shipment from one place to another.

Another object of the invention is to so construct the rotary crushing roller that it may consist of a plurality of companion sections securely held in engagement with each other to produce a roller of the desired dimensions and weight.

Another object of the invention is to permit the sections forming the crushing roller to be firmly held together but very easily taken apart for shipment or storage in a small space.

The invention is illustrated in the accompanying drawings, wherein

Figure 1 is a view looking at one end of the improved quartz mill.

Figure 2 is a view showing the improved quartz mill partially in side elevation and partially in vertical section, the view being taken along the line 2—2 of Figure 1.

Figure 3 is a sectional view taken along the line 3—3 of Figure 2.

Figure 4 is a perspective view illustrating the manner in which the plates forming the annular wall of the drum are connected with the heads thereof.

Figure 5 is a perspective view illustrating the construction of the section forming the crushing roller.

This improved quartz mill is of simplified construction and consists, briefly, of a rotatably mounted drum 1 in which is loosely mounted a crushing roller 2. The drum consists of annular heads 3 formed of thick metal discs having alined center openings 4 of appreciably smaller diameter than the discs themselves but sufficiently large to permit ore to be fed into the drum above the crushing roller when the crushing roller is in place and resting upon the lower portion of the drum, as shown in Figures 1 and 3. The annular wall of the drum is formed of a number of plates or sections 5 which extend longitudinally of the drum between the heads 3, and, upon referring to Figures 3 and 4, it will be seen that each of these plates or sections is arcuate transversely and along one side edge is formed with an outstanding rib 6 having an undercut inner side edge face. The plates or sections 5 are spaced from each other circumferentially of the drum and in order to support the plates, the drums are formed with recesses 7 leading from their inner faces. These recesses 7 extend circumferentially of the heads and are curved longitudinally to conform to the transverse curvature of the plates. Each recess is formed at one end with an outwardly projecting extension 8 to receive the rib 6 of the plate 5 which fits into the recess. It will thus be seen that when the ends of the plates or sections 5 are engaged in the recesses 7 with ends of the ribs 6 fitting into the extensions 8, tie rods 9 which extend longitudinally of the drum, externally of the annular wall thereof, may be passed through the openings 10 formed in the heads and the heads drawn towards each other and cause the heads to have supporting engagement with the plates or sections 5. The outer marginal portions of the heads which project radially from the annular wall formed by the sections 5 constitute rims for the drum which have their edge faces resting upon flanged rollers 11 carried by shafts 12 which extend longitudinally of a base 13 and are rotatably mounted in bearings 14 carried by the base at opposite ends thereof.

The rollers 11 are spaced from each other transversely of the base at each end thereof, as shown in Figures 1 and 3, and engage the rims of the drum in such spaced relation to each circumferentially thereof that when the drum is resting upon the rollers, it will be permitted to be turned when the rollers are rotated but can-

not move out of a position in which it rests properly upon the rollers. The flanges of the rollers engage the outer side faces of the heads, as shown in Figure 2, and prevent the drum from shifting longitudinally out of its proper position. At one end of the base, each of the rollers is formed with a beveled gear **15** or separate gears may be firmly secured to ends of the shaft **12**. These gears mesh with smaller gears or pinions **16** carried by a drive shaft **17** extending transversely of the base and rotatably mounted in bearings **18**. Rotary motion may be imparted to the drive shaft in any desired manner but in the present illustration there has been shown a pulley **19** fixed to the drive shaft and engaged by a belt **20**. As the rollers **11** are all keyed or otherwise firmly secured to the shaft **12**, rotary motion will be transmitted from the drive shaft **17** to all of the rollers and the drum will be rotated in a very efficient manner during operation of the mill.

Referring to Figures 3 and 4, it will be seen that inner faces of the sections **5** of the annular wall of the drum are covered by wear plates **21**, each of which extends the full length and width of the section to which it is applied and is curved transversely to conform to the transverse curvature of the section. Bolts **22** are passed through the plates and sections to securely but detachably hold the plates in close contacting engagement with the sections and the heads of the bolts are counter-sunk in the plates so that they are flush with the plates and will not offer obstructions during operation of the mill. These plates shield the sections **5** and may be removed and new ones applied when they become worn. Sheets of screening **23**, which may be of any predetermined size of mesh desired, extend from one of the sections **5** to another with their marginal portions secured against the outer faces of the ribs **6** by screws **24** passed through the screens and into threaded sockets **25** formed in the ribs. By so mounting the screens they will be firmly held in place with their longitudinal edges in contact with each other but the screens may be removed when renewal thereof is necessary or when it is desired to substitute screens of different mesh for those already in place. The size of mesh to be used will be determined according to how fine it is desired to have the ore ground before it passes out of the drum through the screens. In view of the fact that the sections **5** are spaced from each other and, except for their rib **6**, spaced from the screens, there will be formed pockets **26** each extending the full length of the drum and having a reduced entrance slot **27** through which ore which has been ground to a predetermined fineness may pass. The side edge faces **28** of the sections **5** are beveled, as clearly shown in Figure 3, and, therefore, the entrances **27** increase in width towards the pockets **26**. This eliminates likelihood of ground material becoming wedged in the entrances and failing to properly pass into or out of the pockets. By providing the drum with the pockets, ore which has been crushed to sufficient fineness between the crushing roller and the sections **5** of the annular wall, may enter the pockets which are lowermost and as the pockets move upwardly during rotation of the drum, crushed ore in the pockets which is of sufficient fineness, will pass through the screens and out of the drum. The crushed ore which is not fine enough to pass through the screens will be retained in the pockets until the pockets move across the upper portion of the drum and downwardly at the opposite side thereof from the pockets moving upwardly. As the pockets move across the upper portion of the drum and then downwardly, the crushed ore in the pockets will flow outwardly through the entrances **27** back into the interior of the drum and will again pass between the roller and the drum sections for another crushing operation. It will thus be seen that the ore will be repeatedly subjected to the crushing weight of the roller until it has been reduced to a sufficiently fine state to pass through the screens. Therefore, only crushed ore of a desired fineness will be delivered from the drum.

The crushing roller consists of a plurality of sections, each of which is constructed as shown in Figures 2 and 5. The sections from which the roller is formed are indicated in general by the numeral **29** and a suitable number will be used according to the length of the roller. Each of the sections consists of companion shells **30** having marginal flanges **31** which face each other and have face to face contacting engagement with each other so that the two shells may enclose a disc **32** formed of heavy metal. The weight of the disc will be controlled by the type of metal from which it is formed and, therefore, each section of the crushing roller may be of a predetermined weight and the weight of the entire roller controlled. Passages **33** are formed through the disc in spaced relation to each other circumferentially thereof and these passages register with openings **34** formed in the shells so that tie-rods **35** may be passed longitudinally through the roller and securely hold the roller sections and the shells and disc **32** from which the sections are formed in close contacting engagement with each other. In view of the fact that the roller is formed of companion sections, it may be any length and any weight desired and if one of the sections becomes worn or accidentally broken, it can be easily removed and a new one set in place. This also permits the crushing roller to be taken apart for storage or shipment. I have, therefore, provided a quartz mill which is of simplified construction and very efficient in its operation.

Having thus described the invention, what is claimed as new is:

A mill comprising a drum rotatable about a horizontal axis and having heads and an annular wall, the heads having their inner faces formed with recesses and the annular wall consisting of a plurality of longitudinally extending sections spaced from each other circumferentially of the drum and having their end portions seated in said recesses, tie-rods externally of the annular wall extending longitudinally of the drum with their end portions extending through the heads and maintaining the heads in engagement with ends of the annular wall sections to hold the ends of the said wall sections in said recesses, said sections being each formed along one side edge with an outstanding rib, sheets of screening secured against the ribs of said wall sections and together with the wall sections defining a plurality of pockets having screened outer portions and each having a reduced inlet formed by spaced portions of the sections, and crushing means in said drum.

FREDERICK L. MINNICK.