F. ANSLEY.

GRINDING MILL.

APPLICATION FILED JAN. 14, 1915.

1,147,067.

Patented July 20, 1915

2 SHEETS—SHEET 1.

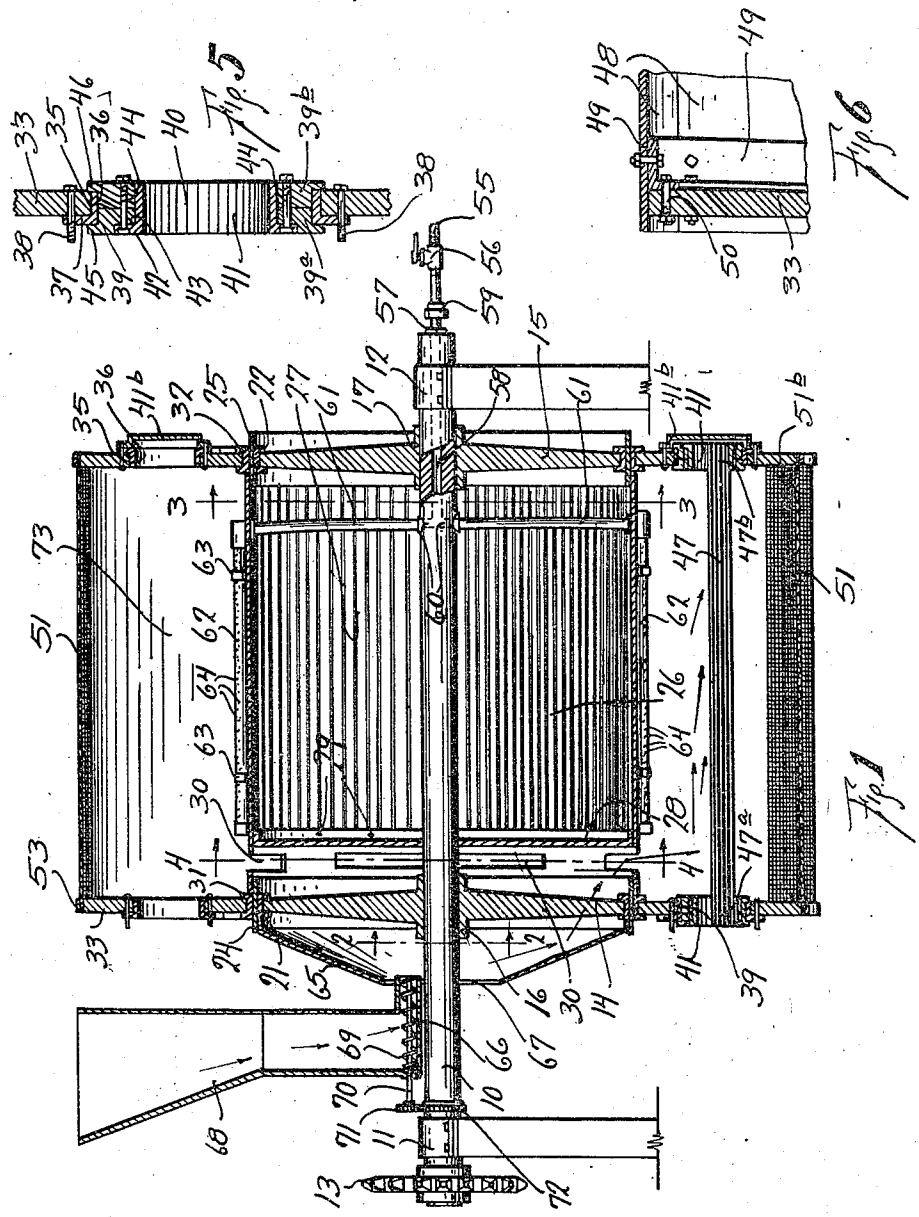


Fig. 1

Fig. 5

Fig. 6

Witnesses

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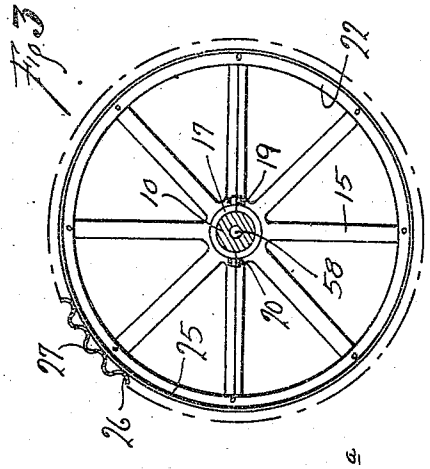
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2 SHEETS—SHEET 2.

Fig. 3.



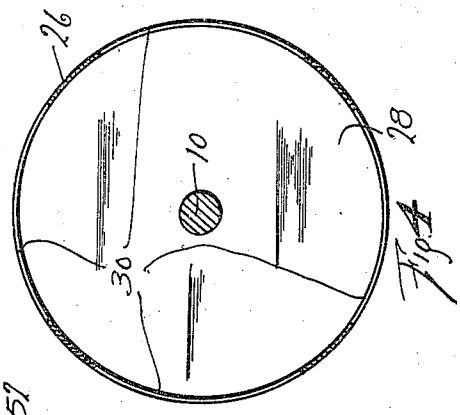


Fig. 4.

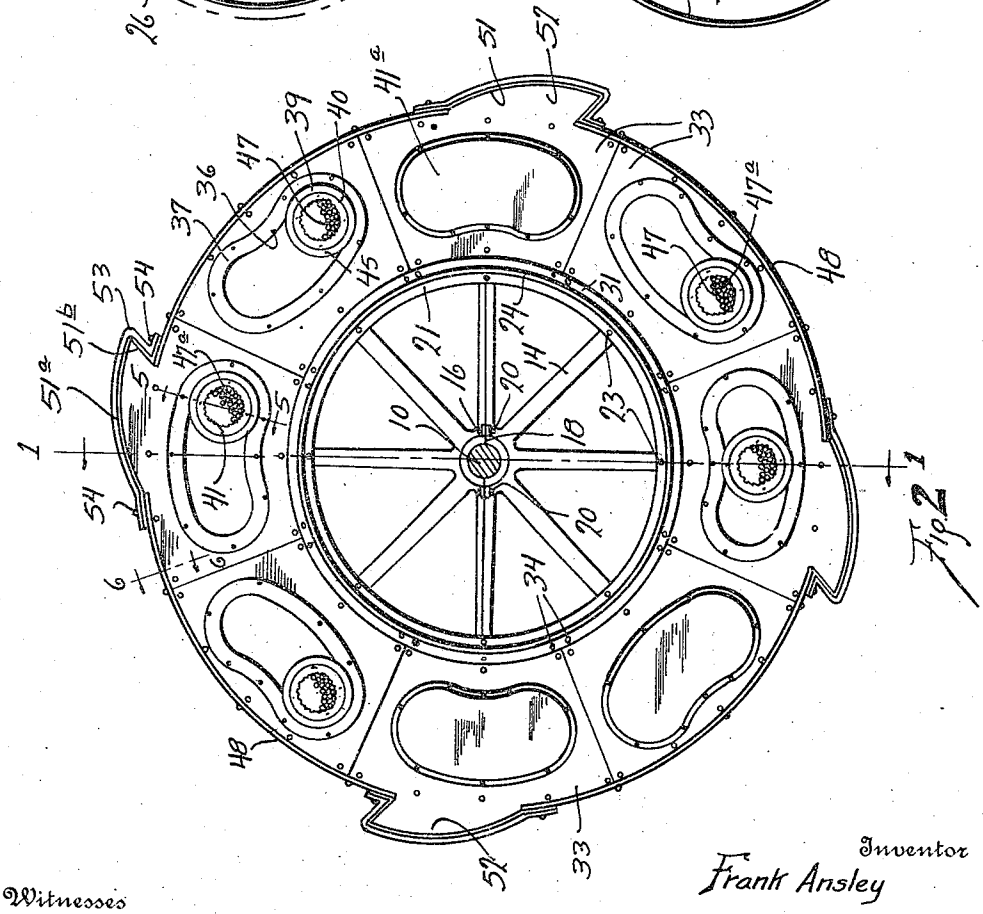


Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

FRANK ANSLEY, OF SPOKANE, WASHINGTON.

GRINDING-MILL.

1,147,067. Specification of Letters Patent. **Patented July 20, 1915.**

Application filed January 14, 1915. Serial No. 2,273.

To all whom it may concern:

Be it known that I, FRANK ANSLEY, a citizen of the United States of America, residing at Spokane, in the county of Spokane and State of Washington, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

This invention relates to improvements in grinding mills and has for its object to provide a mill which shall render a maximum amount of efficiency in grinding ores and consume a minimum amount of power.

A further object is to provide a portable mill which shall be easily taken apart and set up and yet be inexpensive to manufacture.

A special novel feature of the invention consists in so arranging the grinding mediums and so disposing the ore to be ground that the mill will be much more effective in its grinding efficiency than the mills now in use.

A further novel feature consists in so constructing the mill that such parts of it as will receive the greatest amount of wear may be easily and readily replaced.

A further novel feature consists in so arranging the outlet screens that they will redeposit upon the grinding elements such ore as has not been screened out.

Other features of novelty will be more fully described in connection with the accompanying drawings, and will be more particularly pointed out in and by the appended claims.

In the drawing, Figure 1, is a section on line 1—1 of Fig. 2, Fig. 2, is a section on line 2—2 of Fig. 1, Fig. 3, is a section on line 3—3 of Fig. 1, Fig. 4 is a section on line 4—4 of Fig. 1, Fig. 5, is an enlarged section on line 5—5 of Fig. 2, and Fig. 6, is an enlarged section on line 6—6 of Fig. 2.

Like characters of reference designate similar parts throughout the different figures of the drawing.

A main shaft 10 is suitably journaled at 11 and 12, and is provided with means by which it may be revolved, such as sprocket wheel 13. Two sets of spokes 14 and 15 are cast integral with hubs 16 and 17, and these hubs 16 and 17 are split as at 18 and 19 in order to allow for their easy adjustment to the shaft 10. The split portions or hubs 16 and 17 may be secured together by bolts, such as 20. Bolts 20 also serve to fix the hubs 16 and 17 rigidly on shaft 10. Rims 21 and 22 are secured to spokes 14 and 15 by such means as bolts 23, and also secured to the rims 21 and 22 are flange rims 24 and 25. A drum 26 extends from rim 24 to rim 25 and is fastened thereto by any suitable means. The major portion of drum 26 is corrugated on the surface as at 27 for the purpose later described. A solid head 28 is fastened within the drum 26 by such means as bolts or rivets 29. In the drum 26 between the spokes 14 and head 28 are cut the slots 30 as shown in Figs. 2 and 4.

Referring once more to rims 24 and 25, it will be seen that rims 31 and 32 of channel cross sections are fastened to the periphery thereof. Side plates 33 are set within the channel portion of rims 31 and 32 and as fastened therein by bolts or rivets 34. In the side plates 33 are cut holes 35 within which are snugly fitted endless tracks 36 of the general shape shown in the drawings. Tracks 36 are flanged as at 37, through which and the side plates 33 are bolts 38. Tracks 36 will be preferably made of a wear resisting metal.

Within tracks 36 roll the double flanged rollers 39 which will now be described in detail. Referring more particularly to Fig. 5, it will be seen that rollers 39 are constructed in two halves 39^a and 39^b. A ring 40, preferably corrugated or notched on its inside surface, as at 41, is set within rollers 39 and a flange 42 resting in recess 43 provided in 39^a serves to provide a means for securing ring 40 in place. Bolts 44 will hold 39^a, 39^b and 40 together. Flanges 45 and 46 on rollers 39 hold the rollers 39 within the tracks 36.

Grinding rods 47 are laid across the grinder as best shown in Fig. 1 and are so disposed that their ends 47^a and 47^b will lie within the rings 41. End caps 41^a and 41^b are bolted by means of bolts 38 to plates 33 and flanges 37 and serve to hold the rods 47 from shifting laterally. An outer drum

is provided by bolting or riveting curved sheets of metal 48 to strips of angle iron 49, which in turn are fastened, as at 50, to side plates 33. This feature is best illustrated in Fig. 6. At suitable intervals the sheeting or outer drum 48 is omitted and screens 51 substituted. The screens 51 are stretched across suitable lugs 52 provided on the plates 33 at regular intervals and held in place by strips 53 which are secured to drum 48 by bolts 54. The screens 51 thus form longitudinally arranged pockets 51^b.

In grinding ore where it is necessary to use water, I have provided a novel means for introducing such water. A water supply pipe is indicated at 55 and a shut off valve at 56. A nipple 57 is threaded into the end of shaft 10 which is bored out for a short length as indicated at 58. Nipple 57 is connected to pipe 55 by any form of connection as indicated at 59 which will permit of shaft 10 being revolved without interrupting the flow of water from pipe 55 into bore 58. Branches 60 lead from bore 58 to a plurality of flexible connections 61 which connect to pipes 62 which in turn are fastened to drum 26 by straps 63. Pipes 62 are perforated at 64 to allow the water to pass out therethrough.

Referring now to rim 24, it will be seen that a truncated conical drum 65 is fastened thereto and that a feed pipe 66 passes through opening 67. A hopper 68 is provided for the reception of the ore and empties the pipe 66. A lead spiral 69 is mounted on shaft 70 and passes through the bottom of hopper 68 and feed pipe 66. On one end of shaft 70 is mounted a gear 71, which meshes with gear 72, which is mounted on the shaft 10.

I will now describe the operation of the grinding mill. It will of course be understood that shaft 10 will be revolved by means of sprocket 13 and through the medium of spokes 14 and hub 16 the drums 26 and 48 will be revolved. Ore will be admitted into hopper 68 and the lead spiral 66 which is operated by gears 72 and 71 will feed the ore into the drum 65. The ore will then pass between the spokes 14 and drop through the slots 30 into the chamber 73 between drums 26 and 48. The head 28 will prevent the ore from entering inside of drum 26. The rods 47 which are loose in rings 40 will crunch and grind the ore due to their shifting movement and will tend to carry the unground ore upwardly. The corrugations 27 will also tend to carry the ore upwardly and throw it outwardly. As the ore is carried upwardly the heavier and unground portion will continue to drop upon the sets of rods 47 which are at the bottom of the mill, thereby giving a further crushing action. As a given ring 39 is carried around the drum 26 with the mill it will be continually rolling and the corrugation or notches 41 will be continually agitating the rods 47 by carrying them upwardly and dropping the one upon the other thus increasing the grinding action. As the rings reach the highest and lowest points in the revolution of the drums 26 and 48 they will drop or roll to the opposite end of the track 36 thereby dropping the sets of rods 47 sharply and thus deliver much crushing power. The ground ore will find itself thrown outwardly with considerable force to the screens 51 through which it will pass, but should any unground ore be caught in the pockets 51^b formed by screens 51 it will slide out when such screens reach the position 51^a and drop directly upon rods 47^a to be reground. I consider the formation and location of the screens 51 as an important part of my invention.

It will be seen that I not only utilize the grinding power of the rods 47 acting one on the other but also gain the advantage of having the individual sets of rods serve to yield a crushing power. It will also be seen that such parts of the machine as will tend to wear the quickest, such as tracks 36 and rings 41 may be easily replaced by new ones and that the device is easily taken down or assembled.

It is believed that the operation and utility of my invention will be fully understood from the foregoing description, and while I have herein shown and described one specific embodiment of my invention, I do not wish to be limited thereto except for such limitation as the claims may impart.

What is claimed is,

1. In a grinding mill, an outer and an inner drum, there being a chamber formed between said drums, side plates to said outer drum closing the ends of said chamber having slots therein, hollow rollers mounted in said slots, grinding rods loosely laid in said hollow rollers, said rollers adapted to roll from one end of said slots to the other and said rods being adapted to tumble one on the other.

2. In a grinding mill, two drums mounted on one and the same shaft, one outside of the other and adapted to rotate, there being an open space between said drums, the ends of the outer drum having openings therein, grinding rods longitudinally arranged and mounted in the said open space with their ends disposed within said openings, means for carrying said rods, said means being freely movable in said openings and means for feeding material to be ground to the space between said drums.

3. In a grinding mill, two drums mounted

on one and the same shaft, one outside of the other and adapted to rotate, there being an open space between said drums, said outer drum having arcuate slots in its heads, grinding rods longitudinally arranged and mounted in the said open space with their ends disposed within said arcuate slots, carriers for said rods, said carriers being freely movable in said arcuate slots and means for feeding unground rock to the space between said drums.

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

FRANK ANSLEY.

Witnesses:
H. M. WILEY,
L. L. WESTFALL.