

May 30, 1933.

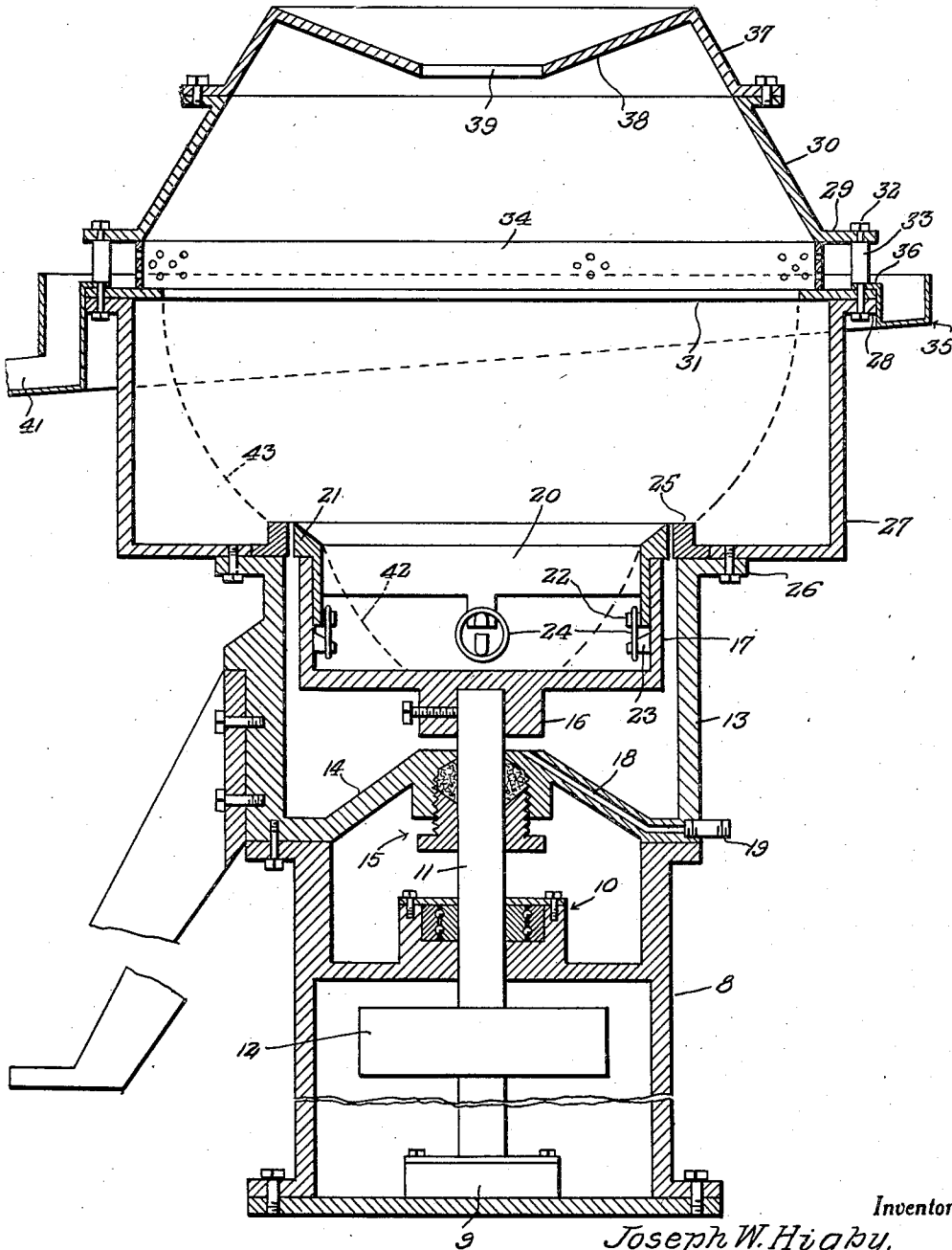
J. W. HIGBY

1,911,568

ORE REDUCTION MILL

Filed May 3, 1932

3 Sheets-Sheet 1



Inventor
Joseph W. Higby,
By Clarence A. O'Brien,
Attorney

May 30, 1933.

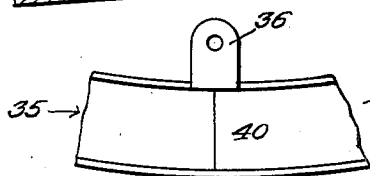
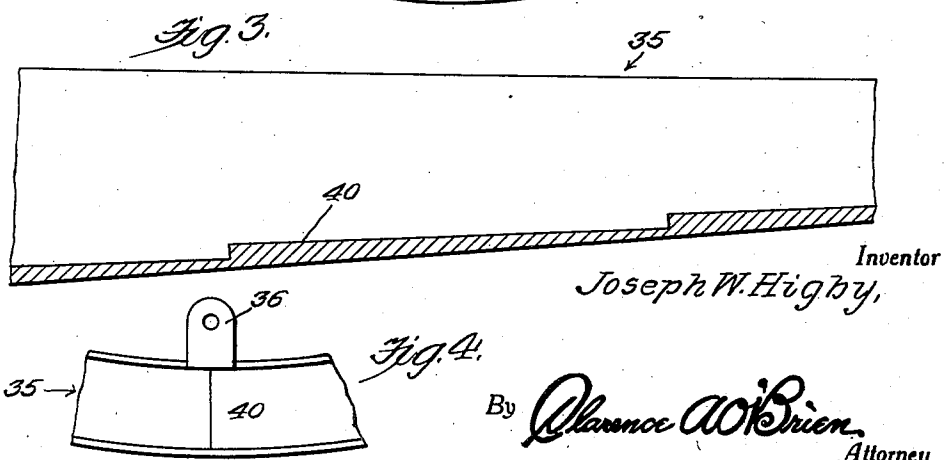
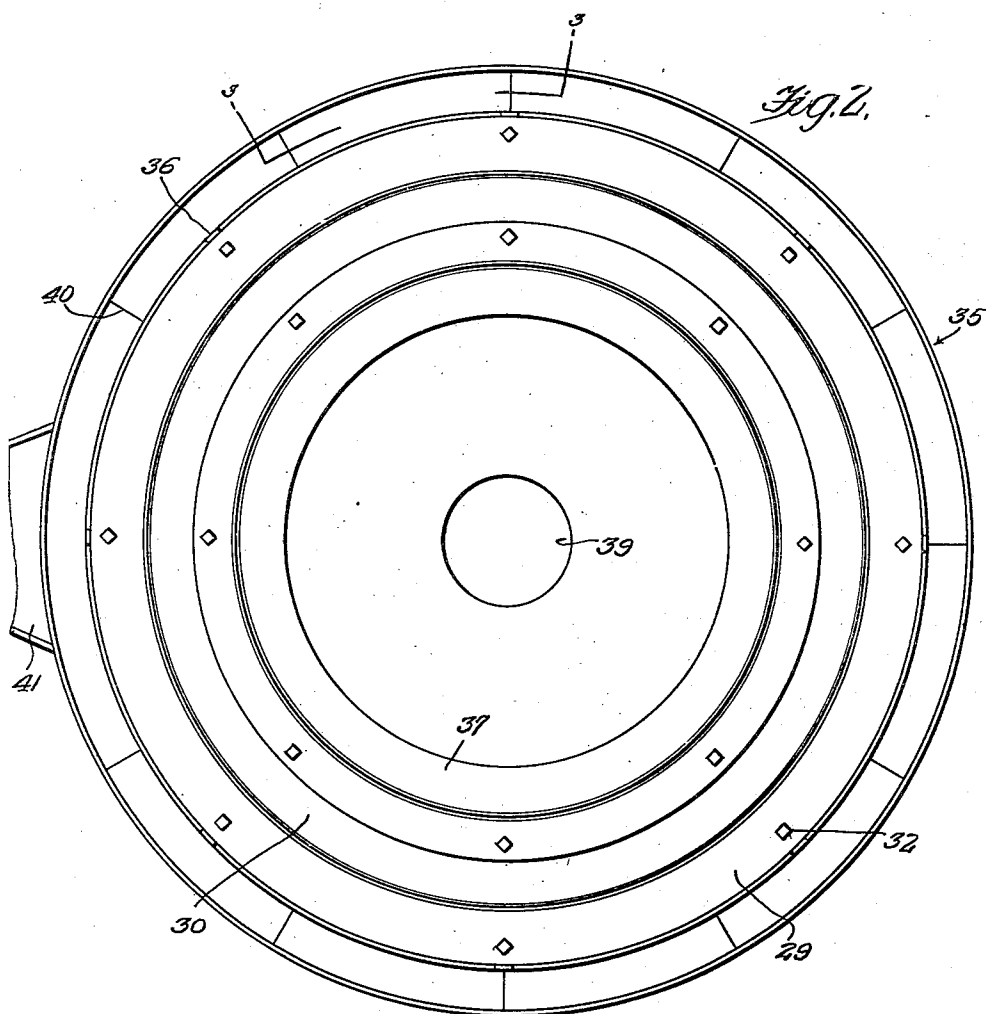
J. W. HIGBY

1,911,568

ORE REDUCTION MILL

Filed May 3, 1932

3 Sheets-Sheet 2



Inventor
Joseph W. Higby,

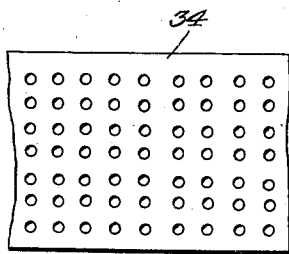
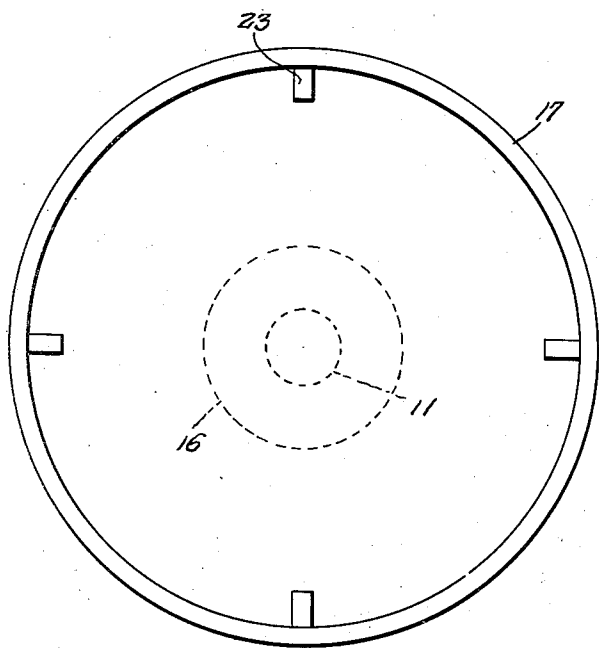
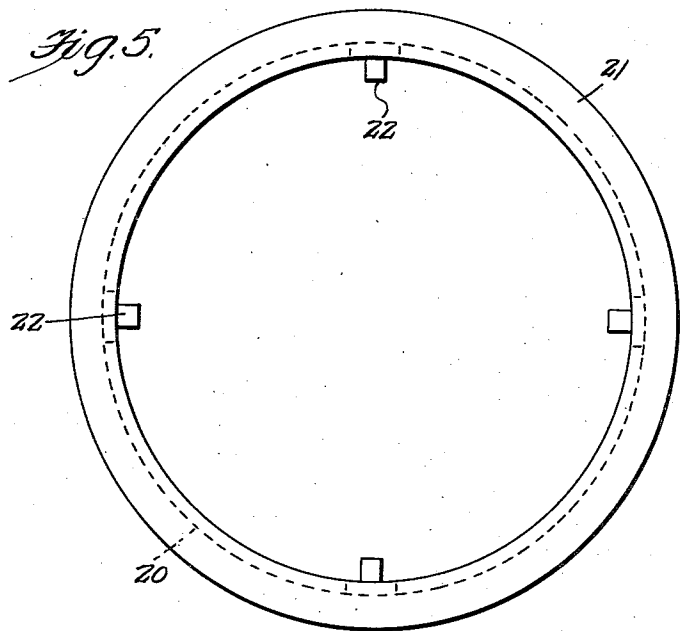
By *Clarence A. O'Brien,*
Attorney

May 30, 1933.

J. W. HIGBY
ORE REDUCTION MILL
Filed May 3, 1932

1,911,568

3 Sheets-Sheet 3



Inventor
Joseph W. Higby,

By *Clarence A. O'Brien*
Attorney

UNITED STATES PATENT OFFICE

JOSEPH W. HIGBY, OF CLARKSTON, WASHINGTON

ORE REDUCTION MILL

Application filed May 3, 1932. Serial No. 608,979.

This invention relates to certain refinements and improvements in grinding mills used for reducing quartz, rock, and ore to the requisite consistency for separating and extraction purposes.

The mill herein illustrated and described is especially, but not necessarily, adapted for handling gold containing ore and is expressly perfected by the incorporation therein of appropriately selected and mechanically co-ordinated parts calculated to better fulfill the requirements of a mill of this class.

My primary aim is to generally improve upon machines of this class by providing one possessing certain noteworthy and appreciable wear resisting features especially suitable and practical to promote power and force and to materially enhance the value of the ore reducing characteristics of the improved mill.

The explicit structural improvements will become more readily apparent from the following description and drawings.

In the drawings:

Figure 1 is a view in section and elevation of an ore grinding mill constructed in accordance with the principles of this invention.

Figure 2 is a top plan view thereof.

Figure 3 is a section taken approximately on the plane of the line 3—3 of Figure 2.

Figure 4 is a fragmentary plan view of the material discharge trough.

Figure 5 is a plan view of a renewable wear collar.

Figure 6 is a plan view of the rotary bowl.

Figure 7 is a fragmentary elevational view of the separating screen.

The general assembly of the construction may well be seen as it is illustrated in Figure 1 of the drawings. Here the numeral 8 designates a suitable base having an end thrust bearing 9 and a superposed bearing 10 to accommodate the perpendicular rotary shaft 11 of the rotor. The rotor is here shown as provided with a pulley 12 to accommodate a propulsion belt or equivalent driving element.

Detachably bolted on the upper end of the

base is a casing 13 whose bottom 14 constitutes a divider or partition, the same being provided with a stuffing box 15 through and beyond which the shaft 11 extends. The shaft is fitted into a socket 16 on the bottom of the cup-like bowl 17. The bottom 14 is formed with a water delivery duct or passage 18 located below the bowl and at the intake end of the water passage is a nipple or fitting 19 to accommodate the water supply pipe (not shown).

The numeral 20 designates a wear collar which is fitted telescopically into the upper end of the bowl and provided with an overhanging beveled rim 21 seated on the upper edge of the wall of the bowl. The collar is provided with circumferentially spaced lugs 22 aligned with complementary lugs 23 on the bowl to accommodate the coupling and retaining links 24. This serves to hold the collar removably in place in the bowl.

The collar has its rim portion terminating in a plane substantially flush with a wear ring 25 fastened to the flange 26 of the upper end portion of the casing 13. The collar and ring are spaced apart to provide a passage for the upwardly flowing column of water.

The numeral 27 designates that which may be distinguished as a receiver and this has a flange 28 at its top to which several parts connect. In the first place, the flange 29 on the lower section 30 of the hopper is secured thereto. Moreover, the annulus 31 which projects into the receiver is secured thereto by the bolt 32. Incidentally, the numerals 33 designate spacing sleeves surrounding the bolt. Moreover, the numeral 34 designates a separating screen which is clamped between the annulus 31 and the flange 29. The numeral 35 designates the trough having lugs 36 clamped in place by the same bolts 32. This is a unique and economical assembly.

The upper cap section of the hopper is distinguished by the numeral 37 and has a conical receptacle portion 38 provided with a central material delivery hole 39.

Attention is invited to the trough 35 which surrounds the screened outlet and which is of appropriate depth and proportions and

preferably formed with a stepped bottom, the stepped portions being denoted by the numeral 40 as seen in Figures 3 and 4. Finally, the numeral 41 designates the discharge or outlet of the trough which conveys the dust laden water to the desired point of deposit for recovery work.

Particular attention is invited to the renewable collar 20 and the associated renewable wear ring 25. These are the only parts which are subject to excessive wear and they are therefore renewable for frequent exchange purposes. Another feature to be emphasized is the arrangement wherein the collar and ring are spaced apart to provide an annular slot through which the column of water rises. Moreover, introduction of the water beneath the bowl 23 is believed to be important in that it accomplishes the flotation step properly and promotes expeditious separation and recovery work.

A highly important feature yet to be mentioned is the arrangement wherein the ore is banked as indicated at the points 42 and 43. These deposits of ore or other material build up in the approximate manner illustrated in dotted lines and serve as wear banks materially saving the adjacent parts which as obvious are subjected to rapid deterioration from the centrifugal rock flowing process developed by the rotation of the bowl.

It is manifest that the ore or other material to be ground is introduced through the hopper inlet hole 39 and collect in the bowl 17 which is directly therebeneath. When the machine is started, the centrifugal force builds the wear resisting banks 42 and 43. Obviously, by properly supplying water from beneath the rotating bowl and by rotating the bowl at an excessive speed, the desired pressing and milling effects are accomplished. Incidentally, the ring 31 constitutes an abutment or ledge which projects beneath the screen and protects the screen against excessive damage. Hence it is in a sense a guard member.

By adopting and utilizing this simplified combination of mechanical parts, I have obviously developed a mill which will do the work satisfactorily and provide results beyond expectation. It is evident that any suitable amalgamation and recovery steps may be used for accumulating and salvaging precious metals from the ore.

Particularly do I wish to emphasize the water-proofing arrangement of the base, the sturdy rotatable mounting for the rotor, and the perfection in the closing of the rotor together with the water-delivery means for injecting the water under pressure at a point below the bowl of the rotor, allowing the water to rise between the bowl and casing so that it may elevate into the hopper unit. In fact, it is evident that the structure as herein devised and described is destined to

better fulfill the requirements of a mill of this class in that it promotes expeditious output, is light in weight, yet sturdy, portable for transportation purposes, and repair, and otherwise well fitted to insure gratifying results.

It is thought that the description taken in connection with the drawings will enable a clear understanding of the invention to be had. Therefore, a more lengthy description is thought unnecessary.

While the preferred embodiment of the invention has been shown and described, it is to be understood that minor changes coming within the field of invention claimed may be resorted to if desired.

I claim:

1. In a grinding mill of the class described, a base provided with bearings, a casing supported on said base, a rotor including a shaft journaled for rotation in said bearings and extending into the casing, a bowl embodied in said rotor and supported in the casing on the upper end of the shaft, a removable wear collar fitted into the upper portion of the bowl, a wear ring supported on the upper end of the casing and spaced from the adjacent marginal portion of the collar, a hopper supported from the casing and enclosing the ring and collar, said hopper including upper and lower sections, and a separate screen mounted in the hopper between said sections, and a material receiving trough supported from the hopper adjacent said screen.

2. An ore reduction mill of the class described comprising a base provided with bearings, a casing supported on said base and provided with a centrally elevated bottom having a stuffing box and a water delivery passage, a shaft mounted in the bearings and extending up through the stuffing box and into the casing, a bowl supported on the upper end of the shaft and confined in said casing and having its wall spaced from the wall of the casing to allow passage of the water therebetween, a renewable wear collar fitted telescopically into the bowl, a wear ring surrounding the collar in spaced relation and supported on said casing, a receiver attached to the upper end of the casing, a hopper including upper and lower sections, the lower section being formed with an outstanding circumferential flange, the upper end of said receiver having a flange matched with said first-named flange, an abutment annulus attached to said last-named flange and extending into the receiver, a screen clamped between the abutment annulus and said first-named flange.

3. An ore reduction mill of the class described comprising a base provided with bearings, a casing supported on said base and having a centrally elevated bottom formed with a central stuffing box and an

adjacent water delivery passage, a shaft mounted in the bearings and extending up through the stuffing box and into the casing; a bowl supported on the upper end of the shaft and substantially confined in said casing and having its wall spaced from the wall of the casing to allow passage of the water between said walls, a renewable wear collar fitted telescopically into the bowl, a wear ring surrounding the collar in spaced relation supported on said casing, a receiver attached to the upper end of the casing, a hopper including upper and lower sections, the lower section being formed with an outstanding circumferential flange, the upper end of said receiver having a flange matched with said first-named flange, an abutment annulus attached to said last-named flange and extending into the receiver, a screen clamped between the abutment annulus and said first-named flange, together with a trough surrounding the receiver and having apertured ears bolted between said flanges, said trough being located in a plane to receive the overflow material passing through said screen.

4. An ore handling and reduction mill of the class described comprising a base equipped with bearings, an open top casing supported on said base and provided with a centrally arranged elevated portion having a stuffing box and a radial open-ended water delivery duct, a shaft mounted for rotation in the base and extending up through the stuffing box into the casing, a material receiving bowl confined in said casing and attached to the upper protruding end of said shaft, the bowl being spaced from the casing to allow water to pass therebetween, a collar fitted telescopically and removably in said bowl and having an overhanging ledge resting on the upper edge of the wall of the bowl, said rim having a bevelled surface, a wear ring supported on said casing and spaced from said rim to provide a restricted annular slot for passage of the water, a receiver removably attached to the upper end portion of the casing and of a diameter greater than the casing, said receiver having a flange at its top, a hopper including an upper section having a depressed centrally apertured portion, and a lower section, said lower section having a flange matching the flange on said receiver, bolts passing through said flanges, spacing sleeves surrounding the bolts and spacing the flanges apart, an abutment and guard annulus secured to the first-named flange by said bolt and extending into the receiver, an annular screen clamped between said annulus and second-named flange, together with an annular trough having its inner wall provided with apertured ears secured to said bolts between said flanges.

5. An ore handling and reduction mill of the class described comprising a base equipped with bearings, an open top casing supported on said base and provided with a centrally arranged elevated portion having

a stuffing box and a radial open-ended water delivery duct, a shaft mounted for rotation in said bearings and extending up through the stuffing box into the casing, a material receiving bowl confined in said casing and attached to the upper protruding end of said shaft, the bowl being spaced from the casing to allow water to pass therebetween, a collar fitted telescopically and removably in said bowl and having an overhanging ledge resting on the upper edge of the wall of the bowl, said rim having a bevelled surface, a wear ring supported on said casing and spaced from said rim to provide a restricted annular slot for passage of the water, a receiver removably attached to the upper end portion of the casing and of a diameter greater than the casing, said receiver having a flange at its top, a hopper including an upper section having a depressed centrally apertured portion, and a lower section, said lower section having a flange matching the flange on said receiver, bolts passing through said flanges, spacing sleeves surrounding the bolts and spacing the flanges apart, an abutment and guard annulus secured to the first-named flange by said bolt and extending into the receiver, an annular screen clamped between said annulus and second-named flange, together with an annular trough having its inner wall provided with apertured ears secured to said bolts between said flanges.

In testimony whereof I affix my signature.

JOSEPH W. HIGBY.

100

105

110

115

120

125

130