No. 894,174. PATENTED JULY 21, 1908.

J. SMITH, DEC'D.

I. SMITH, ADMINISTRATOR.

MECHANISM FOR AGITATING AND HANDLING ORE OR OTHER SUBSTANCES.

APPLICATION FILED FEB. 25, 1907.

2 SHEETS—SHEET 1.

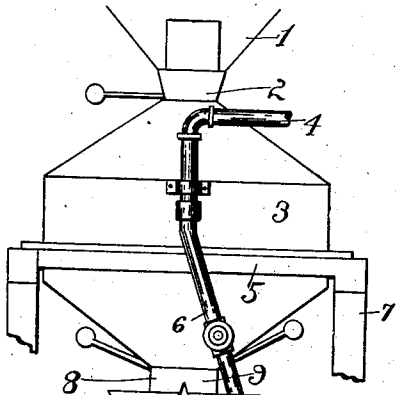


Fig. 1.

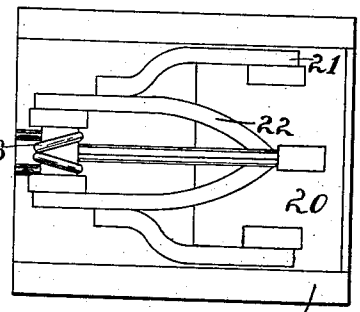
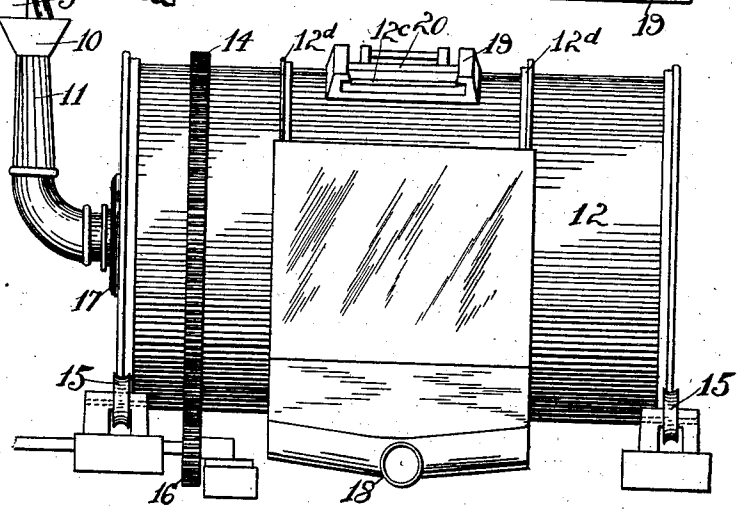


Fig. 4.



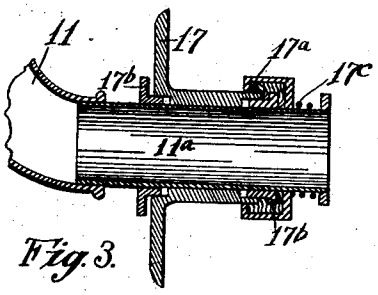


Fig. 3.

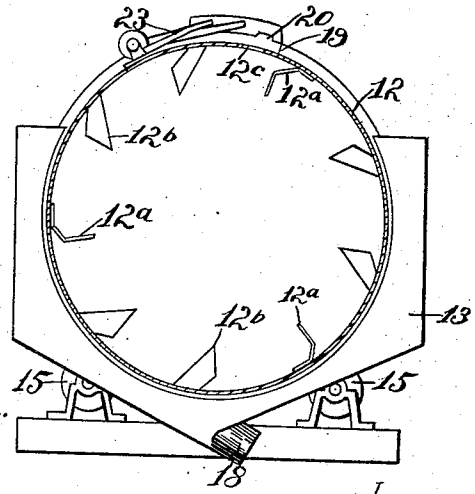


Fig. 2.

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2 SHEETS—SHEET 2.

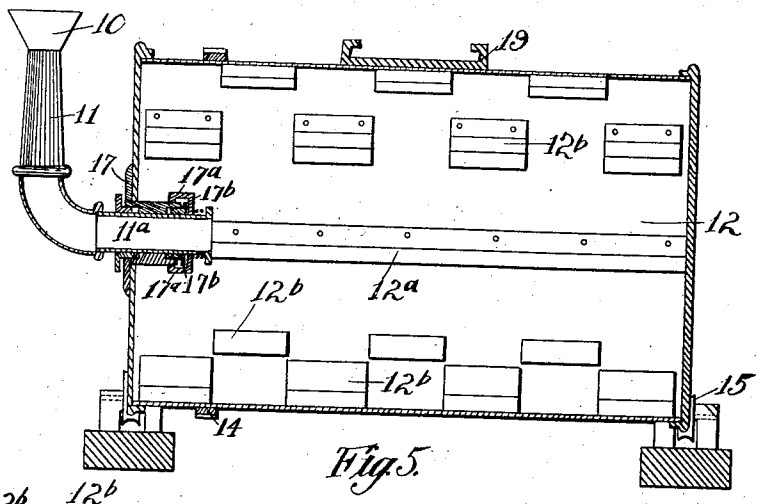


Fig. 5.

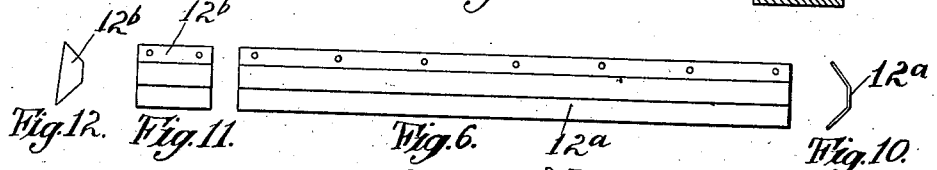


Fig. 12. Fig. 11. Fig. 6. Fig. 10.

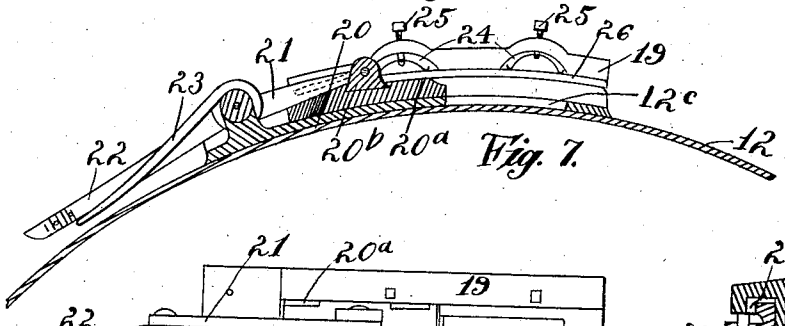


Fig. 7.

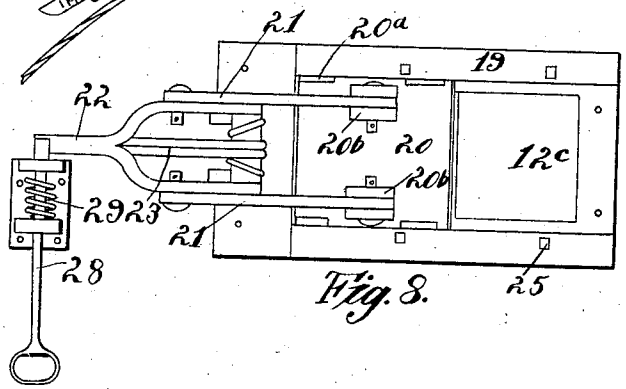


Fig. 8.

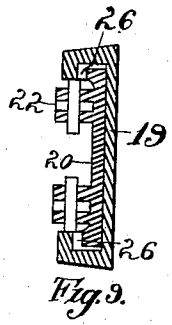


Fig. 9.

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UNITED STATES PATENT OFFICE.

JOSEPH SMITH, OF SALT LAKE CITY, UTAH, ASSIGNOR OF ONE-HALF TO EDWARD P. LYNCH, OF SALT LAKE CITY, UTAH; ISAAC SMITH ADMINISTRATOR OF SAID JOSEPH SMITH, DECEASED.

MECHANISM FOR AGITATING AND HANDLING ORE OR OTHER SUBSTANCES.

No. 894,174. Specification of Letters Patent. Patented July 21, 1908.

Application filed February 25, 1907. Serial No. 359,218.

To all whom it may concern:

Be it known that I, JOSEPH SMITH, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Mechanism for Agitating and Handling Ore or Other Substances, of which the following is a specification.

My invention relates to rotary agitators for agitating gold and silver ores with cyanid or other solutions for dissolving the precious metals contained therein. At present it is usual to agitate the pulverized ore with its dissolving solution in upright agitators or tanks, with the agitating device set horizontally at or near the bottom, or by upright stirrers connected at or near the top of the tank. The trouble with this class of agitators, is, that the method of agitating is very imperfect, because of the tendency of the heavier particles to settle at or near the bottom, thus clogging or even stopping the apparatus, especially if the ores contain pyrites, lead, zinc, baryta etc., and if for any cause the machinery stops, it is then extremely difficult or even impossible to start it going again, without digging out the charge, or obtaining relief in some other inconvenient way.

My apparatus is a rotary agitator or barrel horizontally set, and continuous in its operation, so that it neither stops to receive its charge or load of crushed ore and solution, nor to discharge the same, I provide an ore charging bin, connected with any main storage adapted to receive the crushed ore as it is delivered from the crushing or grinding machinery.

The ore charging bin may be made to hold any number of tons of crushed ore according to the charges required. The charges are fed in at the axis of the agitator around which said agitator revolves. I also connect with the admission a solution pipe connected with the solution supply tank, so that the required amount of ore, (gaged by the capacity of the charging bin), and the required amount of solution, (gaged by the register on the solution tank), are admitted at the same time; the ore charging bin, and the solution pipe or hose having valves conveniently placed, so that the operator can handle both at the same time. In order that the agitator may discharge its load or charge of crushed ore and solution while it continues to revolve, I provide one or more sliding valves, which can be opened or closed at the will of the operator, or when it becomes necessary to discharge the contents of said agitator. The object of loading and unloading this agitator while it continues to revolve is, that if stopping to load, it would require double the power to start it revolving again that it would require to run it. In addition the ore would settle if allowed to stand still only a few minutes, so that it would be necessary to either shovel or wash it out; whereas, if the agitator continues to revolve while receiving and discharging its load, a great saving of time and power is made. Further after its contents are discharged, it is clean and ready for the next charge or load, and does not require washing or shoveling out. I also provide a suitable hopper to receive the ore and solution as it is unloaded or discharged from the revolving agitator.

An embodiment of my invention is shown in the accompanying drawings in which,

Figure 1 is an elevation of my improved rotary agitator, showing also means for feeding ore thereto, and means for feeding the solution thereto while the agitator is revolving, and an external view of the discharge gate or valve and of the hopper into which such valve is enabled to discharge the contents of the agitator while the latter is in motion. Fig. 2 is an end elevation of the rotary agitator one of the heads of the rotary barrel being cut away. Fig. 3 is a longitudinal section of the inlet passage communicating with the axis of the agitator. Fig. 4 is a plan view of the discharge valve or slide, and the means for operating it. Fig. 5 is a central longitudinal section of the barrel. Fig. 6 is an elevation of one of the interior longitudinal agitators. Fig. 7 is an enlarged view partly in section of the discharge valve or gate and its operating mechanism, the valve being shown as open. Fig. 8 is a detail plan view of the same parts in the same positions. Fig. 9 is a cross section of the sliding discharge valve and its guides. Fig. 10 is a cross section of the agitating or stirring blade shown in Fig. 6. Fig. 11 is an elevation of one of the short agitating buckets, of which

a number are disposed throughout the interior of the barrel. Fig. 12 is a cross section of the same.

Referring to Fig. 1 I have shown at 1 the lower part of a storage chamber for crushed ore, located above, and communicating with the ore charging bin 3 by the funnel 2, the supply being regulated, by any suitable gate, an example of which is shown conventionally. The ore charging bin 3 may be square, circular or of any other suitable shape in cross section, but in any event it is preferably of conical or tapered shape, both at top and bottom, so as to insure its receiving a full charge of the finely crushed ore run in from above. The bin is supported by any suitable frame-work as indicated at 5 and 7. I prefer to provide the discharge throat of the bin with duplicate discharge passages, which are merely indicated at 8 and 9, and which have individual gates. The purpose of this is to allow two agitating barrels to be used in connection with a single ore charging bin, so that the bin can either discharge alternately into said barrels, or so, that in case of accident and stoppage of a barrel, operation can continue in the second barrel. The bin discharges into a hopper 10 and pipe or chute 11. The solution pipe 4 has preferably a flexible section 6, so that it can be swung from its hopper 10, to the companion hopper which feeds the other barrel when two are used.

The pipe 11 is curved and enters the axis of the rotary agitating barrel 12 supplying simultaneously the proper quantities both of crushed ore and of the cyanid or like solution. The construction of inlet which I prefer to use is shown in detail in Fig. 3 the same being liquid tight while permitting the barrel 12 to rotate freely. A flange sleeve 17 is bolted to the head of the barrel, and has its inside bored true to form a bearing. The other part of this bearing is the straight axial pipe 11^a coupled to the supply pipe 11 and formed as a true cylindrical bearing, upon which the sleeve 17 turns. Stuffing boxes or glands 17^b, 17^b are interposed at both the front and rear end between the parts 17 and 11^a. It will be understood that as the flange of part 17 is secured externally to the barrel head, everything to the right of that flange in Fig. 3 projects into the interior of the barrel. I utilize this long bearing to provide room for the perforated box 17^a, which is secured to the pipe 11^a and has also the bearing on the sleeve 17. This box cannot rotate, but is free to slide on pipe 11^a and a spring 17^c tends to force it constantly against interior gland 17^b. This box is filled with cotton waste or like material, saturated with some heavy mineral oil or grease. When the agitator is revolving with its load of ore and solution, this greasy spongy mass will fill up with fine sands or slimes, which will combine with the grease and reduce to a minimum the danger of the coarse and sharp sands working into the bearing. The spring causes the contents of the box to press continually both against the pipe 11^a and the inside gland 17^b.

The rotary agitating barrel 12, to which the ore charges and solution are admitted in the manner just described, is a cylinder preferably supported in a horizontal position. Fig. 1, and also Fig. 5 show it as set in a frame in which are mounted grooved bearing pulleys 15 upon which it rests and upon which it revolves, it being provided with circumferential ribs which rest in the grooves of said pulleys. The barrel is driven slowly but continuously by any suitable mechanical arrangement such as the spur gear 14, and the pinion 16, the latter being upon any suitable driving or driven shaft for transmitting power. In Fig. 2 is shown a vertical end elevation of the barrel with one of its heads removed and this view should be read in connection with Fig. 5 and also with Figs. 10, 11, and 12. The barrel is provided with longitudinal angle plates or generally convex plates 12^a, which are made the full length of the barrel. These blades or buckets are intended to perform two functions. First, they act as supporting ribs to give structural support to the barrel; and secondly to compel an even flow over their edges as they pass upward through the charge. With these longitudinal convex agitators are associated other agitators 12^b having the staggered arrangement shown in Fig. 5 and which operate to separately break up the mass of ore as it falls over the long agitating blades 12^a in an even flow. The motion in Fig. 2 is with the hands of a clock. By this combination of long spreading agitators and associated staggered breaking up agitators, I keep the entire charge in constant movement and greatly increase the action on the coarse and heavier particles.

An important part of my invention is the discharge of the ore and solvent without stopping the revolution of the barrel, the latter revolving continuously, receiving charges of ore and solution while revolving, and discharging the solvent mass without stopping or checking the rotation.

Referring first to Figs. 1 and 2, it will be seen that the barrel 12 is at about its middle inclosed for a great part of its circumference by a hopper 13 having a bottom outlet 18. A valve is arranged to open an outlet in the barrel, which discharges into the said hopper. The hopper is stationary and surrounds the middle section of the barrel for the greater part of its extent as shown in Figs. 1 and 2. When the discharge in the side of the barrel is opened, the contents will escape into and then from this hopper for any further treatment. The barrel has circular rings or flanges 12^d preferably of angle iron and which

prevent any material discharging into the hopper from spreading over the surface of the barrel itself.

The discharge from the barrel acts while it is revolving. An opening is formed in the amidship section of the barrel, which opening is very clearly shown in Fig. 7, Figs. 4, 8 and 9 should also be referred to. A bed plate 19 is bolted or otherwise secured to the barrel, which forms a guide for the sliding valve 20, the surface being of course properly planed. Fig. 9 shows this clearly and indicates side guides on the bed plate, so that the valve shall be held properly in position when being moved. Beneath the side guides are pressure springs 24 regulated as to pressure by screws 25 passing down through the guides. These springs bear upon guides and pressure bars 26, preferably of hardened steel. The valve plate 20 is therefore confined between the planed face of the bed plate below and the spring pressed bars 26, above. Planed bearings 20^a are preferably formed with the valve plate, in the nature of short ribs bearing directly against the pressure bars 26. On the upper surface of the valve plate, are lugs 20^b to which are hinged parallel links 21, which in turn are jointed to the yoke lever 22. This lever is hinged upon a transverse shaft or pin having a coil spring 23 whose free end extends back beneath the yoke lever. A spring toggle joint is thus formed, the lever being used by an operator to open the valve and the spring 23 closing it. When it is desired to discharge the barrel the operator standing in a position where the barrel is rotating from him grasps the lever 22, and either by holding it rigidly, or by directly pulling upon it, causes it to assume the position of Fig. 8 at which time it is locked by a spring bolt 28, 29. The valve is now open and the barrel discharging into its inclosing hopper the revolution never being stopped. When discharged the operator releases the bolt 28, permitting the springs 23 to return all parts to the position of Fig. 4 with discharge valve closed.

I do not wish to confine myself to particular details of construction herein described and shown in the accompanying drawings although I now consider them as best for their intended purpose; but I desire to avail myself of such modifications and requirements as fall properly within the spirit of my invention.

What I claim is:

1. In an agitating apparatus for the described purpose, a barrel horizontally disposed, means for revolving the same continuously, means for supplying crushed ore to the barrel while it is revolving, means for simultaneously supplying a solvent solution, means for retaining in the barrel the material supplied, and means for discharging the contents while the barrel is revolving.

2. In a rotary agitator, a barrel having a horizontal axis, means for causing a continuous rotation of said barrel, an ore charging bin having a connection through the axis of said barrel for supplying material to it while it is revolving, a supply pipe for a solvent solution entering said connection, whereby the barrel receives simultaneously and while revolving charges of ore and a supply of said solution, means for retaining in the barrel the material supplied, and means for discharging the contents while the barrel is revolving.

3. In a rotary agitator, a horizontally disposed barrel, means for revolving said barrel continuously, means for supplying charges of ore and of solution to the barrel at its axis, one or more discharge openings in said barrel, and controllable valves for said openings, whereby the barrel retains its contents and can be discharged of its contents while revolving.

4. In a rotary agitator for the described purpose, a horizontally disposed barrel means for revolving said barrel continuously, means for supplying charges of ore and of solution into the barrel at its axis, a hopper partially surrounding said barrel, one or more discharge openings in said barrel, and controllable valves for said openings whereby the barrel may be discharged of its contents while revolving.

5. A rotary agitating barrel, means for rotating it continuously, means for receiving crushed ore and solution simultaneously through the axis of the barrel, valved openings in the wall of the barrel, and a stationary hopper closely inclosing said barrel; whereby while the barrel is being constantly rotated charges of ore, along with the solution can be admitted to its interior; and whereby while the barrel is revolving the mass in solution can be discharged through said valved openings into said hopper.

6. In a rotary agitator, the combination with a barrel having a horizontal axis of rotation, of an ore-charging bin adapted to contain a regulated quantity of crushed ore, a pipe into the upper end of which said bin is discharged, a solution supply also discharging into the upper end of the said pipe, and a connection from said pipe in and through an axis of the barrel and forming a journal upon which the barrel turns; whereby charges of crushed ore and of solution may be admitted to the barrel while in motion.

7. The barrel 12 with an opening in one end, a flanged sleeve 17 extending into said opening and having its flange secured to the barrel head, a stationary pipe 11^a within and forming a journal for said sleeve, glands between said sleeve and pipe, and a supply pipe connected to said stationary pipe.

8. A rotary barrel having an axially open end, a stationary pipe entering said opening and forming a combined admission passage

and journal, and a perforated box on the said pipe slidably mounted and spring pressed substantially as and for the purpose set forth.

9. In combination with a horizontally set rotary barrel the interior longitudinal convex stirrers 12^a extending from end to end, and the short intermediate stirrers 12^b in staggered arrangement.

10. In combination with a rotary horizontally set barrel, a hopper inclosing the greater part of the cross section of said barrel and conforming closely to its circular shape, and valved openings in the barrel which are always covered by said hopper whenever in position to discharge.

11. A horizontally set rotary barrel having a discharge opening in its wall, a slide valve for closing the same, a lever for operating the said valve and means for locking the lever with the valve open.

12. A horizontally set rotary barrel having a discharge opening in its wall, a slide valve for closing the same, a lever for operating the said valve, a lock for the lever when the valve is open, and a spring for throwing the lever and closing the valve when said lock is released.

13. A horizontally set rotary barrel having a discharge opening in its wall, a guide plate having a coinciding opening, a slide valve movable in the guide plate, pressure bars bearing on the opposite side of the slide valve, and springs bearing on said pressure bars whereby the valve is kept to its seat.

14. A horizontally set rotary barrel, having a discharge opening in its wall, a slide for covering and uncovering said opening, and means for operating said slide comprising links jointed to the slide, a pin, and a yoke lever hinged on said pin and to said links.

15. A horizontally set rotary barrel having a discharge opening in its wall, a slide for covering and uncovering said opening, links jointed to the slide, a pin, a yoke lever pivoted upon said pin and to said links, and a spring on the pin whose free ends bear beneath the yoke lever and tend to throw it so as to close the slide.

16. In a horizontally set rotary barrel having a discharge opening, the combination with the slide valve 20, operating lever 22 and closing spring 23, of the sliding spring pressure bolt 28 for locking the lever in position with the slide valve open.

In testimony whereof I affixed my signature in presence of two witnesses, this 22nd day of January 1907.

JOSEPH SMITH.

Witnesses:
M. M. HISKEY,
C. P. HILTON.