B. O. WEBB.

CYANID BARREL.

APPLICATION FILED DEC. 17, 1909.

956,655. **Patented May 3, 1910.**

Fig. 1.

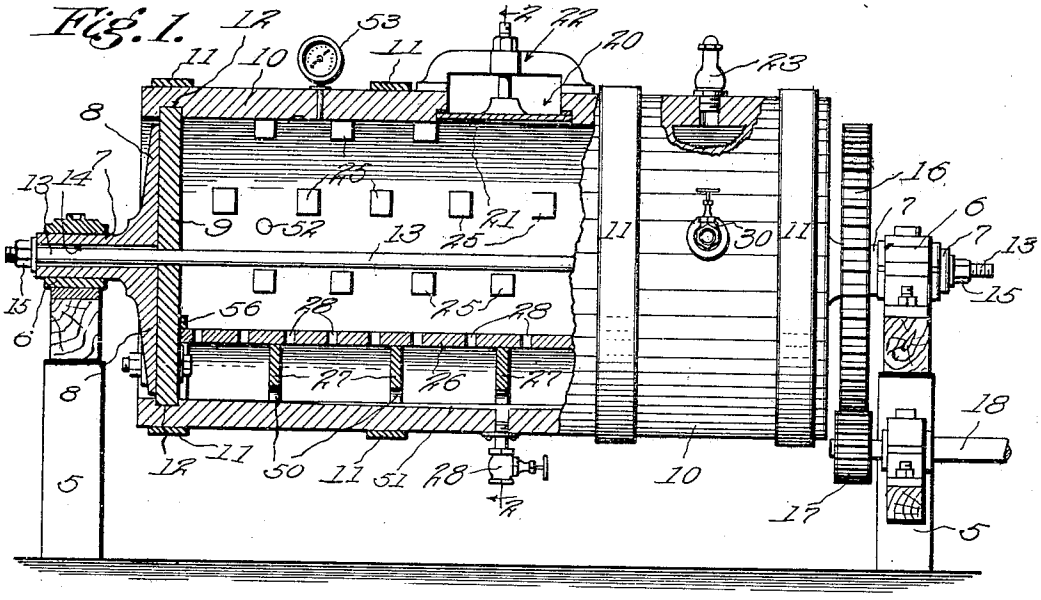


Fig. 2.

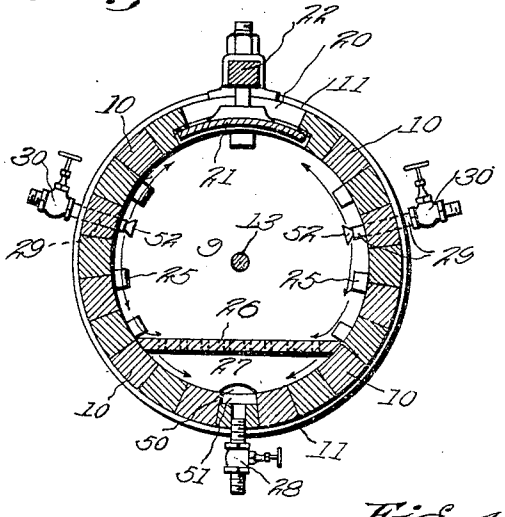


Fig. 3.

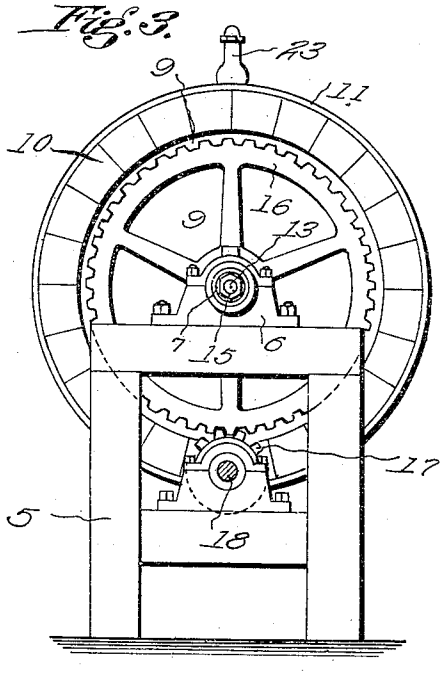
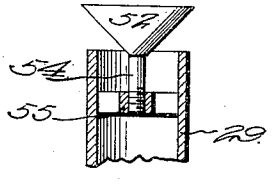


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

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CYANID-BARREL.

956,655. Specification of Letters Patent. Patented May 3, 1910.

Application filed December 17, 1909. Serial No. 533,707.

To all whom it may concern:

Be it known that I, BENJAMIN O. WEBB, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Cyanid-Barrels, of which the following is a specification.

This invention relates to apparatus for treating gold, silver, copper and other ores by chemical processes, whereby the metals are dissolved in a cyanid or other solution and thus removed from the large body of ore in which they occur. Heretofore a tank apparatus has been utilized for the carrying on of this process, the tanks being open and occasioning a loss of the solution by evaporation to the atmosphere. This has greatly increased the cost of leaching and has been a disadvantage in many ways.

It is the object of my invention to provide an apparatus which overcomes all of the above named difficulties and, in addition, which has other advantages inducing celerity of the manipulation and efficiency of leaching.

The invention consists in an inclosed and revoluble tank or barrel, in which the liquid and ore may be placed. This barrel is equipped for being tightly closed after the materials have been introduced and with means for forcing free oxygen or other oxidizing agents into the barrel under pressure. When the barrel is rotated the oxidizing agent, the cyanid solution and the ore are all thoroughly agitated, so that the metals are quickly dissolved in the solution. When this is done, pressure, water or air, is forced into the barrel above the liquid, the liquid being forced downwardly through a perforated floor and out of the barrel at its lowermost portion. Means are provided to quickly wash out the barrel after the operation is completed. The combination is thus essentially that of a cyanid barrel adapted to be operated under pressure and equipped with a rapid washing means, and a pressure filter, all in one piece of apparatus. The following description will deal with the machine in this particular relation.

In the accompanying drawings, Figure 1 is a sectional elevation of my improved machine. Fig. 2 is a cross section of the barrel taken on line 2—2 of Fig. 1. Fig. 3 is an end elevation of the same. Fig. 4 is a detail section of my improved washing means.

In the drawings 5 designates pedestals of any desired character, these pedestals being both supplied with bearings 6 of an approved design on their upper ends. Bearings 6 revolubly carry trunnions 7, these trunnions having preferably integral flanges 8 which are secured to wooden heads 9 of the barrel. Heads 9 are surrounded by wooden staves 10 which form the lateral walls of the barrel and are securely held by hoops 11 so that the whole structure is liquid tight. The heads are mortised into the staves as at 12, a liquid tight joint being thus effected. The whole structure is compressed longitudinally by a bolt 13 which passes through longitudinal bores 14 in trunnions 7, passing through the barrel and heads 9, and having nuts 15 on its ends so that any desired degree of tension may be placed thereon. This bolt holds the heads tightly against the inner shoulder of the mortises in the staves and prevents the structure from loosening and losing its rigidity. This construction is one of the structural features of my invention.

On one of the trunnions 7 is mounted a gear 16, and with this gear a small driving pinion 17 meshes. Pinion 17 is mounted on a driving shaft 18 which may be driven in any desired manner to rotate the barrel at a suitable speed. This speed is usually low, the agitation being better effected at low than at high speed.

At a point in the lateral walls of the barrel which is uppermost when the barrel is at rest, there is cut an opening, or manhole, 20 of suitable size for the insertion and withdrawal of ore. This opening is closed by an ordinary manhole cover 21 secured in position by clamping device 22 so as to efficiently close the opening against the escape of any liquid or gases. The upper side of the barrel is also provided with a pop valve 23 which will relieve any excessive gas pressure generated during action and prevent the barrel being injured thereby. A pressure gage 53 is also provided so that the pressure may be observed, and, in case the pop valve fails to operate automatically at the proper pressure, the machine can be stopped and the valve opened manually to relieve the excess pressure. It will be under-

stood that during the operation considerable gas is generated and the confinement of this gas causes considerable pressure. As the gas aids in the dissolving action it is desirable to retain as much as possible in the barrel without endangering its integrity.

On the inside of the barrel are spaced projecting knobs 25, these knobs being secured to staves 10 in any suitable manner. Preferably, the knobs are made of wood and are fastened to the staves by lag screws. These knobs pass through the solution and crushed materials when the barrel is rotated and stir and agitate it so that every portion of the crushed materials come into intimate contact with the solution and allow the values to be more quickly removed.

Across the bottom of the barrel is constructed a floor 26, supported on beams 27 and having perforations 28 through which the liquid in the barrel may be forced by pressure introduced above. The floor is secured by cleats 56. Beams 27 are provided with notches 50 on their under sides at the bottom of the barrel so that an open passage is provided for the clear liquid filtered from the upper part of the barrel. A stop cock 28 controls the discharge from the bottom of the barrel, allowing the liquid to be drawn off when desired. A beveled trough 51 leads slopingly from the ends of the barrel to the center where stop cock 28 is located so that all the liquid may be rapidly withdrawn.

On each side of the barrel a means is provided for introducing liquids and gases to the upper part of the barrel. This means is comprised in nipples 29 leading through the walls of the barrel on each side and at each end, and having on their outer ends valves 30. By this means the necessary liquids and gases may be introduced, under pressure if desired, after the ores have been introduced through the manhole. The washing of the barrel is also accomplished through these nipples, as will be hereinafter explained.

In operation, the ores and liquids are introduced to the barrel and the manhole closed. The desired gas is then introduced through valves 30, some pressure being used and the gas retained in the barrel under pressure. The barrel is then rotated for the desired length of time and the ores, liquid and gas are agitated by the projecting knobs on the inside of the barrel and are intermingled with each other so that the metals are rapidly dissolved by the liquids. After this has been sufficiently accomplished the barrel is stopped in its upright position and the liquids allowed to settle down through perforated floor 26 into the lower portion of the barrel. They are then drawn off through stop cocks 28. During this operation pressure is applied, if necessary, to the upper surface of the liquid and ores in the upper part of the barrel by forcing air or water into the barrel through one or more of valves 30. This hastens the discharge of the solution through the perforated filter floor. The barrel is then turned over and the solid material removed through the manhole, the interior of the barrel being washed out clean through the manhole by water introduced through valves 30.

On the inner ends of nipples 29 are mounted coneshaped deflectors 52, there being an opening between the end of the nipple and the deflector for the passage of water. The cones are mounted on studs 54 which are screwed into webs 55 inside the nipples. This construction may be varied if occasion demands, the essential feature being the supporting of the cone at the illustrated position. By means of the deflector the water for washing is partly turned in the direction indicated by the arrows so that it is forced directly against and along the interior lateral surface of the barrel and filter bottom. The surfaces are thoroughly washed and cleansed, the washings passing out through the manhole when the barrel is turned over.

It will be seen that my invention consists of a means to facilitate the extraction of values by several distinct means and aids. First, the barrel is inclosed and the gases generated during the action prevented from escaping, unless they should reach such a pressure as to endanger the integrity of the barrel, when they are relieved by the pop valve. Second, the necessary oxygen or oxidizing agents are added in compressed form to aid efficiently in dissolving the metals. Third, the crushed materials and the clear solution are separated while still in the barrel without the necessity of being removed to another machine. Fourth, there is provided an efficient and quickly acting means for cleansing the barrel for the insertion of the next charge.

Having described my invention, I claim:—

1. A device of the class described, comprising a barrel structure mounted upon a horizontal axis and adapted to revolve thereon, a horizontal perforated floor within the barrel and dividing its interior into upper and lower compartments, knobs projecting from the inner surface of the lateral walls of the barrel, means for introducing materials to the upper compartment of the barrel, means for introducing fluids to the upper part of the barrel, and means for withdrawing liquids from the lower part of the barrel beneath the perforated floor therein.

2. A device of the class described, comprising a barrel structure mounted upon a horizontal axis and adapted to revolve thereon, a horizontal perforated floor within the

barrel and dividing its interior into upper and lower compartments, knobs projecting from the inner surface of the lateral walls of the barrel, means for introducing materials to the upper compartment of the barrel, means for introducing fluids to the upper part of the barrel, means for withdrawing liquids from the lower part of the barrel beneath the perforated floor therein, and means for washing out the interior of the barrel.

3. In a device of the class described, a washing nozzle, comprising a nipple projecting into the barrel interior, and a cone shaped deflector mounted on the end of the nipple.

4. A device of the class described, comprising a barrel structure mounted upon a horizontal axis and adapted to revolve thereon, a horizontal perforated floor within the barrel and dividing its interior into upper and lower compartments, knobs projecting from the inner surface of the lateral walls of the barrel, means for introducing materials to the upper compartment of the barrel, means for introducing fluids to the upper part of the barrel, means for withdrawing liquids from the lower part of the barrel beneath the perforated floor therein, means for washing out the interior of the barrel comprising a nipple projecting into the barrel interior, and a cone shaped deflector mounted on one end of the nipple.

5. A device of the class described, comprising a barrel structure mounted upon a horizontal axis and adapted to revolve thereon, a horizontal perforated floor within the barrel and dividing its interior into upper and lower compartments, knobs projecting from the inner surface of the lateral walls of the barrel, means for introducing materials to the upper compartment of the barrel, means for introducing fluids to the upper part of the barrel, means for withdrawing liquids from the lower part of the barrel beneath the perforated floor therein, means for washing out the interior of the barrel comprising a nipple projecting into the barrel interior, a cone shaped deflector mounted on the end of the nipple, pressure indicating means, and means for relieving any excess gas pressure in the barrel interior.

6. In a device of the class described, a barrel structure mounted upon a horizontal axis and adapted to rotate thereon, a horizontal perforated floor within the barrel and dividing its interior into upper and lower compartments, knobs projecting from the inner surface of the lateral walls of the barrel, means for introducing materials to the upper compartment of the barrel, means for introducing fluids to the upper part of the barrel, means for withdrawing liquids from the lower part of the barrel beneath the perforated floor therein, and means located at the sides of the barrel structure for introducing liquids for washing out the structure.

7. A device of the class described, comprising a barrel structure composed of a pair of heads and lateral walls surrounding and connecting the heads, trunnions mounted on the heads, a horizontal perforated floor extending across the lower portion of the barrel interior, transverse beams extending across the barrel beneath the floor and supporting the same, the beams being provided with notches in their lower edges for the passage of liquid lengthwise of the barrel, the wall of the barrel being provided with a groove directly beneath the notches, liquid outlet means connecting with the groove, knobs projecting into the interior of the barrel above the perforated floor, and means for introducing materials to the barrel above the perforated floor.

8. A device of the class described, comprising a barrel structure composed of a pair of heads and lateral walls surrounding and connecting the heads, trunnions mounted on the heads, a horizontal perforated floor extending across the lower portion of the barrel interior, transverse beams extending across the barrel beneath the floor and supporting the same, the beams being provided with notches in their lower edges for the passage of liquid lengthwise of the barrel, the wall of the barrel being provided with a groove directly beneath the notches, liquid outlet means connecting with the groove, knobs projecting into the interior of the barrel above the perforated floor, means for introducing materials to the barrel above the perforated floor, and washing means for the interior of the barrel above the perforated floor.

9. A device of the class described, comprising a barrel structure composed of a pair of heads and lateral walls surrounding and connecting the heads, trunnions mounted on the heads, a horizontal perforated floor extending across the lower portion of the barrel interior, transverse beams extending across the barrel beneath the floor and supporting the same, the beams being provided with notches in their lower edges for the passage of liquid lengthwise of the barrel, the wall of the barrel being provided with a groove directly beneath the notches, liquid outlet means connecting with the groove, knobs projecting into the interior of the barrel above the perforated floor, means for introducing materials to the barrel above the perforated floor, and means for washing out the interior of the barrel comprising nipples projecting through the walls of the barrel along the sides thereof, and cone shaped deflectors mounted on the inner end of the nipples.

10. In a device of the class described, a barrel, nipples projecting through the lateral walls of the barrel on approximately opposite sides thereof, and cone shaped deflectors mounted on the ends of the nipples and adapted to spread the liquid emerging from the nipples.

In witness that I claim the foregoing I have hereunto subscribed my name this 11th day of December 1909.

BENJAMIN O. WEBB.

Witnesses:

JAMES T. BARKELEW,

JAS. H. BALLAGH.