C. BOUILLON.

APPARATUS FOR LEACHING MINERALS.

APPLICATION FILED FEB. 16, 1921.

1,406,525. Patented Feb. 14, 1922.

Fig. 1

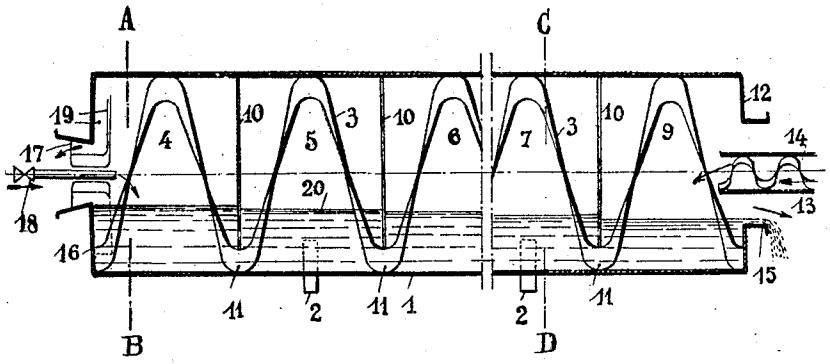


Fig. 2

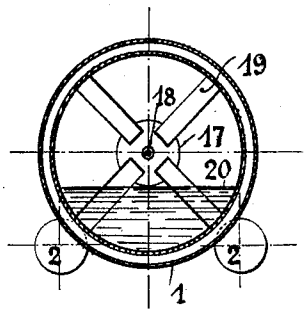
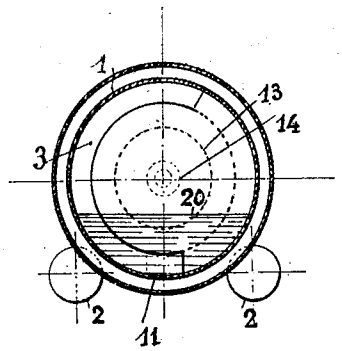


Fig. 3



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APPARATUS FOR LEACHING MINERALS.

1,406,525. Specification of Letters Patent. Patented Feb. 14, 1922.

Application filed February 16, 1921. Serial No. 445,541.

To all whom it may concern:

Be it known that I, CHARLES BOUILLON, of 25 Rue de la Pépinière, Paris, France, have invented new and useful Improvements in Apparatus for Leaching Minerals, which improvements are fully set forth in the following specification.

This invention has for its object rotary leaching apparatus for the treatment of minerals containing soluble matters which it is desired to dissolve out for example the leaching of minerals containing sodium nitrate.

Rotating cylindrical apparatus provided internally with a helicoidal worm for moving forward the material to be leached are already known. In such apparatus however the liquid tends, under the influence of the worm, to move in the same direction as the material and thus to mix with it throughout the length of the cylinder, forming throughout the apparatus a liquid of uniform density in place of a liquid of increasing density.

This invention has for its object means for preventing this defect and for ensuring the complete and progressive washing of the material.

According to this invention the rotating cylinder is divided into compartments by partitions fast with the cylinder but each partition is provided with a single hole only for the passage of the worm so that the material to be leached travels continuously through the cylinder while as the wash water can pass out intermittently from one compartment to the other, i. e. when the orifice of the corresponding partition is free from solid matter, its level in each compartment while above the material to be leached is maintained at a level which decreases from the liquid inlet compartment; such successive differences of level forces the liquid to flow in a predetermined direction which is that opposite to the direction of travel of the material.

The invention is illustrated in the accompanying drawings in which Figure 1 is a longitudinal section of the apparatus and Figures 2 and 3 are transverse sections on lines A B and C D of Figure 1.

The apparatus is composed of a horizontal rotating cylinder 1 turning on rollers 2 and driven by any suitable means. The cylinder is provided with an internal worm 3, of small depth, fast with its inner wall.

The cylinder is divided into a number of compartments 4, 5, 6, 7, 8, 9, of equal size by transverse circular partitions 10 at right angles to the axis of the cylinder and fast with its inner wall. Each compartment communicates with its neighboring compartment through a rectangular orifice 11 formed in the partition 10 and located at the wall of the cylinder; such orifice is at the same level as the thread of the worm 3 and is so arranged as to be traversed by the thread so that the material fed forward by the worm is forced to pass through the orifice 11 as if the partition did not exist.

The end 12 of the cylinder is provided with a central circular aperture 13 through which the material to be leached is introduced by a worm 14 or by any other convenient means. Such central aperture is provided with a circular flange 15 over which the leaching liquid which has traversed the cylinder in an opposite direction to that of the material flows.

The opposite end 16 of the cylinder is provided with a similar central aperture 17, but of less size than that of the aperture 13, through which leaching water is introduced from a fixed pipe 18 situated in the centre of the aperture.

On the other hand such end is provided internally with a series of dredge scoops 19 which rotate with it and are so arranged that the solids taken by the scoops from the lower portions of the cylinder are delivered outwards and mixed with a certain quantity of water which is afterwards introduced into the apparatus after separation from the solids either in a special vessel or by any other means.

The apparatus works as follows:—the apparatus working normally and being in continuous rotation the material to be leached is continuously introduced through the central aperture 13 while leaching water is led in through the pipe 18.

By the rotation and the effect of the worm 3 the solids are moved forward in the liquid continuously from the end 12 to the end 16 without hindrance from the transverse partitions 10 until at the end 16 the solids are taken up by the scoops 19 and delivered outside.

Wash water is continuously led in through the pipe 18; in order that leaching may be progressive it is necessary that the water should circulate regularly through the cyl-

inder in a direction opposite that of the solids, i. e. from the end 16 to the end 12. The circulation of water however contrary to that of the solids is influenced by the partitions 10 and water can only pass from one compartment to the other through the rectangular orifice 11 when this is not blocked by solids i. e. when it is nearly at the liquid level 20 in the compartments, such flow therefore can only take place intermittently and there is a hindrance to the longitudinal displacement of the liquid due to which there is a difference in level of the liquid in the various compartments whose level diminishes from one compartment to the other i. e. from the compartment 4 to the compartment 9. Owing to this difference in level, the flow of liquid from one compartment to the next can only take place in one direction viz. that from the higher level to the lower level and so flow of liquid through the apparatus is only possible in one direction viz. from the end 16 to the end 12, i. e. in a direction opposite to that of the feed of the solids.

What I claim is:—

1. In leaching apparatus the combination of a horizontal rotatory cylinder, a helicoidal worm within it, and partitions for dividing the cylinder into compartments each provided with a single orifice at its periphery for the passage of the worm.

2. In leaching apparatus the combination of a horizontal rotatory cylinder, a helicoidal worm within it, partitions for dividing the cylinder into compartments each provided with a single orifice at its periphery for the passage of the worm, and means for supplying the solids at one end and leaching liquid at the other end of the cylinder.

Dated this 28th day of January 1921.

In testimony whereof I have signed this specification.

CHARLES BOUILLON.