

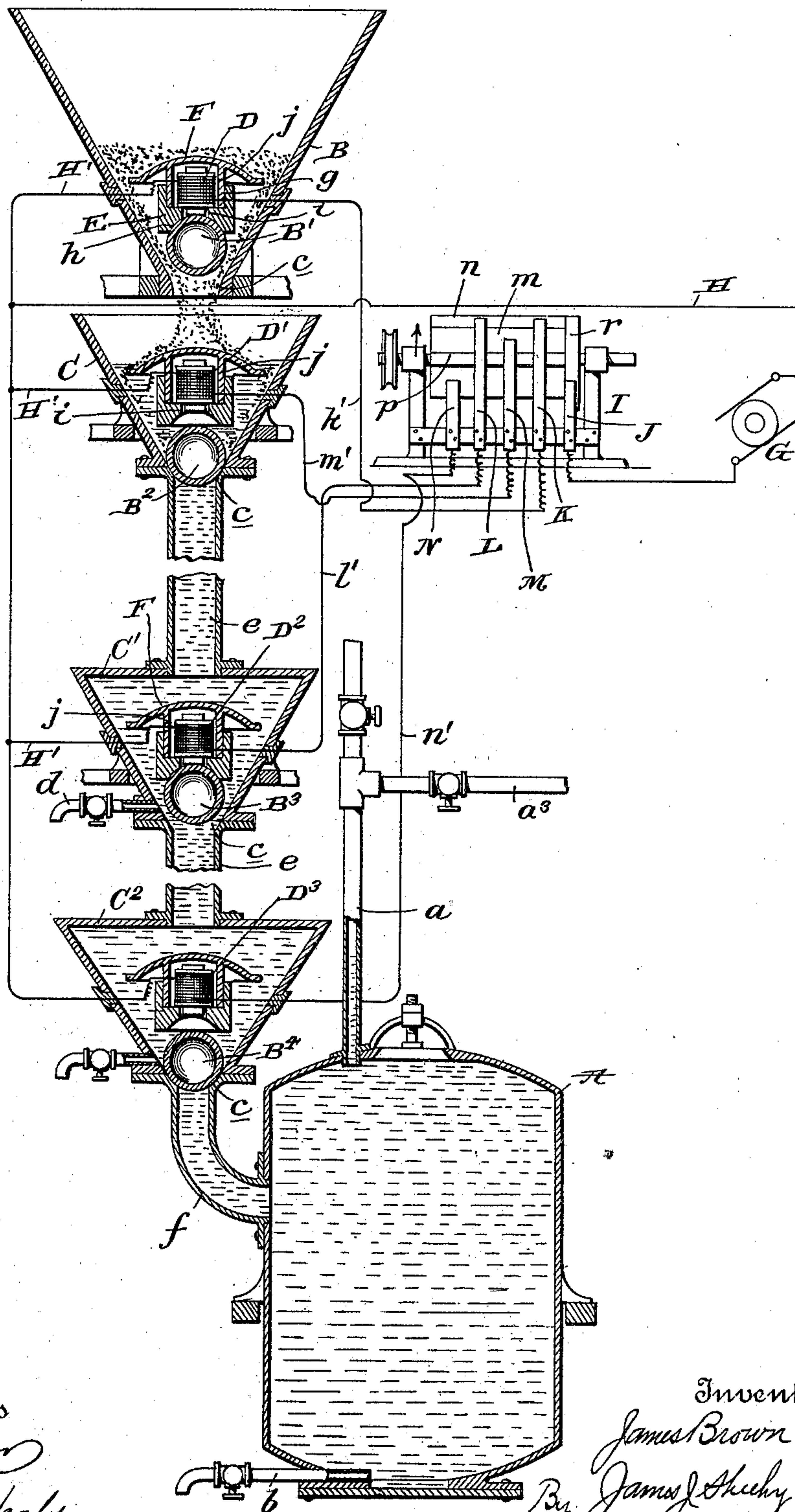
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J. BROWN.
ORE LEACHING APPARATUS.

(Application filed Mar. 25, 1902.)

(No Model.)



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ORE-LEACHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 709,135, dated September 16, 1902.

Application filed March 25, 1902. Serial No. 99,954. (No model.)

To all whom it may concern:

Be it known that I, JAMES BROWN, a citizen of the United States, residing at Tonopah, in the county of Nye and State of Nevada, have invented new and useful Improvements in Ore-Leaching Apparatus, of which the following is a specification.

My invention relates to means for leaching ores; and it consists in the apparatus hereinafter described and claimed.

In the accompanying drawing the figure is a vertical section of an apparatus constituting one embodiment of my invention with some of the parts in elevation.

Referring by letter to said drawing, A is a tank designed to be filled with water through a pipe *a* and provided, by preference, with a drain-pipe *b*; B, an ore receptacle or hopper disposed in a plane above the tank and having a discharge *c* at its lower end controlled by a ball-valve *B'*; C, C', and C², chambers disposed in a vertical series or one above the other intermediate of the hopper B and tank A and having discharges *c* at their lower ends controlled by ball-valves B², B³, and B⁴, respectively, and D, D', D², and D³ electromagnets disposed in the hopper B and chambers C, C', and C², respectively, and adapted when energized to lift the ball-valves from their seats, and thereby permit the pulp to pass down through the discharges *c*.

The chambers C, C', and C² are similar in construction, with the exception that the upper one, C, which is arranged to receive pulp from the hopper B, is open at its upper end and lacks the preferably employed drain-pipes *d* of the other two. Said chambers are connected together in vertical series by the upright tubes *e*, and the discharge *c* of the lower chamber C² is connected to the tank A by a tube *f*.

E E are magnet-supports disposed axially in the hopper and chambers and having recesses *g* in their upper ends receiving the magnets, and concavities *h* in their lowersides to seat the ball-valves, and also having apertures *i* between the recesses and concavities, so as to enable the lower ends of the magnet-cores to attract and hold the ball-valves when the magnets are energized, and F F are hoods disposed over the magnets and having depending flanges *j* arranged in the recesses *g*

of the magnet-supports E. These hoods serve to prevent the pulp from falling on and injuring the magnets and also to deflect the pulp, so that the same will pass downwardly along the side walls of the hopper and chambers to the discharges *c* thereof.

G is a suitable electrogenerator; H H', wires connecting one pole, preferably the positive pole, of the generator and one side of the several magnets D, D', D², and D³; I, a rotary commutator-cylinder designed to be driven by a suitable motor or turned by hand and comprising a body *m*, of insulating material, longitudinal sections *n p*, of copper or other conducting material, and a band *r*, of conducting material, electrically connected with the sections *n p*; J, a brush electrically connected with the negative pole of the generator and contacting with the band *r* of the cylinder I; K L, contact-pieces connected by wires *k' l'* to the opposite sides of the magnets D D², respectively, with reference to the wires H', and M N contact-pieces connected by wires *m' n'* to the opposite sides of the magnets D' D³, respectively, with reference to the wires H'.

The commutator-cylinder is designed to be rotated in the direction indicated by arrow, and when it is so rotated the pieces N M, by reason of their arrangement, will contact with the sections *n p* of the cylinder before the pieces K L and will rest out of engagement with the sections *n p* while the pieces K L are in engagement therewith. From this it follows that when the magnets D D² are energized by current passing from the wires H' through said magnets, the wires *k' l'*, the contact-pieces K L, either of the conducting sections *n p*, the band *r*, the brush J, and back to the negative pole of the generator G the ball-valve B' B³ will be held in a raised position by the magnets and pulp will be permitted to pass through the discharges *c* of the hopper B and chamber C'. At the same time the magnets D' D³ will be deenergized and the ball-valves B² and B⁴ will close the discharges of and prevent the passage of pulp from the chambers C C². It also follows that when the magnets D D² are deenergized by reason of no contact between the pieces K L and either of the cylinder-sections *n p* and the discharges of the hopper D and chamber

D² are closed the pieces M N of the commutator will rest in contact with one of said sections *n p*, the magnets D' D³ will be energized, and the ball-valves B² B⁴ raised to permit pulp to pass through the discharges of the chambers C C². In this latter case the current will pass from the feed-wires H' through the magnets D' D³, the wires *m'* and *n'*, the contact-pieces M N, one of the sections *n* or *p* and the band *r* of the commutator-cylinder, and the brush J to the negative pole of the generator.

All the parts of my improved apparatus which come in contact with the leaching solution are by preference either formed of glass or other material adapted to resist the action of the chemicals or protected by such material. The wires of the circuit system are also properly insulated to prevent divergence of the current.

In the practice of my invention after the tank A is filled with water until the water overflows through the branch *a*³ of pipe *a* and the chambers C C' C² and the tubes *e* are filled with a suitable leaching solution the cylinder of the commutator I is rotated and pulverized ore or pulp is supplied to the hopper B. When this is done, it will be observed that the pulp is permitted to pass from the hopper B to the chamber C and from the chamber C' to the chamber C² simultaneously; also, that when the valves B' B³ are closed the valves B² B⁴ will be opened and the pulp permitted to pass from the chamber C to the chamber C' and from the chamber C² to the tank A. By virtue of the valves B' B³ being closed while the valves B² B⁴ are open, and vice versa, it will be observed that the tailings are prevented from carrying with them any of the chemicals of the leaching solution, which contributes materially to the economy of the leaching operation. It will be further observed that by virtue of my improved apparatus the leaching operation may be practiced with but a minimum amount of solution, slimes which have never before been successfully treated can be easily and thoroughly leached, a much stronger leaching solution can be used than when the solution is employed in great bulk, and the thorough leaching of the ore can be expeditiously accomplished. This latter is due in large measure to the fact that the pulp is passed in small quantities step by step through the apparatus and the mass of pulp is opened or spread *en route*, with the result that the solvent acts against every particle of the mass.

Solvent solution may be withdrawn from the tank C' and also from the tank C when the valve B² is in an open position by simply opening the drain-cock *d* of said tank C'. Ore-pulp may be withdrawn from the tank A through the manhole with which said tank is provided, as shown.

It will be observed from the foregoing that my improved apparatus comprises a vertical

conduit or hollow column connected to and extending upwardly from a tank and provided with one or more valves for controlling the passage of pulp, the said vertical conduit or hollow column being in the present and preferred embodiment of the invention made up of chambers arranged one above the other in vertical series and connected by upright tubes.

I have entered into a detailed description of the construction and relative arrangement of parts embraced in this one embodiment of my invention in order to impart a full, clear, and exact understanding of the same. I desire it distinctly understood, however, that any number and kind of valves may be employed to keep the pulp in place in the conduit formed by the chambers C, C', and C² and the tubes *e*—i. e., prevent a direct passage of the pulp through the conduit; also, that the conduit may be of any description and the valves may be operated by any approved means without departing from the scope of my invention. I further desire it distinctly understood that when electrical means are employed to control the valves the commutator may be of any suitable construction and that such other changes or modifications may be made in practice as fairly fall within the scope of my claims.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An apparatus for leaching ores comprising a tank adapted to contain water or other liquid, a vertical conduit or hollow column connected to and extending upwardly from the tank, and adapted to contain a leaching solution, and one or more valves in the vertical conduit or hollow column for controlling the gravitation of pulp therethrough.

2. An apparatus for leaching ores comprising a tank adapted to contain water or other liquid, a conduit connected to and extending upwardly from the tank and adapted to contain a leaching solution, one or more valves in the conduit for controlling the passage of pulp through the same, and a hood or hoods disposed above the valve or valves and adapted to spread and deflect the pulp so as to enable the same to pass the valves.

3. An apparatus for leaching ores comprising a tank adapted to contain water or other liquid, a conduit connected to and extending upwardly from the tank and adapted to contain a leaching solution, valves arranged one above the other in the conduit for controlling the passage of pulp through the same, and valve-controlling mechanism arranged when operated to simultaneously effect the closure of one valve and the opening of the other and vice versa, alternately.

4. An apparatus for leaching ores comprising a tank adapted to contain water or other liquid, a conduit connected to and extending upwardly from the tank, valves arranged

one above the other in the conduit for controlling the passage of pulp through the same, electromagnets for controlling the valves, an electrogenerator, a movable commutator, and
5 circuit-wires connecting the electromagnets, the generator and the commutator; the said commutator being adapted to change the circuits and the condition of the magnets at intervals, so as to open one valve and close the
10 other simultaneously.

5. An apparatus for leaching ores comprising a tank adapted to contain water or other liquid, a conduit connected to and extending upwardly from the tank and having the plurality of chambers, a hopper disposed above
15 the upper chamber, ball-valves for controlling the discharges of the chambers and hoppers, electromagnets disposed above the valves and adapted when energized to raise
20 the same, the hoods and deflectors arranged in the chambers and hopper above the electromagnets, an electrogenerator, a movable commutator, and circuit-wires connecting the magnets, generator and commutator; the said
25 commutator being adapted to change the cir-

cuits and the condition of the magnets, substantially as specified.

6. An apparatus for leaching ores comprising a tank adapted to contain water or other liquid, a vertical conduit or hollow column
30 connected to and extending upwardly from the tank, and adapted to contain a leaching solution; said conduit or column being made up of chambers arranged one above the
35 other in vertical series and tubes connecting said chambers together and to the tank, valves controlling the discharges of the chambers of the conduit, and valve-controlling mechanism arranged when operated to simultaneously effect the closure of one valve and
40 the opening of the other and vice versa, alternately.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES BROWN.

Witnesses:

EWEL J. HART,
LEON WELLES.