No. 689,799. Patented Dec. 24, 1901.

# R. L. GRAVES.

## ORE LEACHING APPARATUS.

(Application filed Apr. 25, 1901.)

(No Model.)

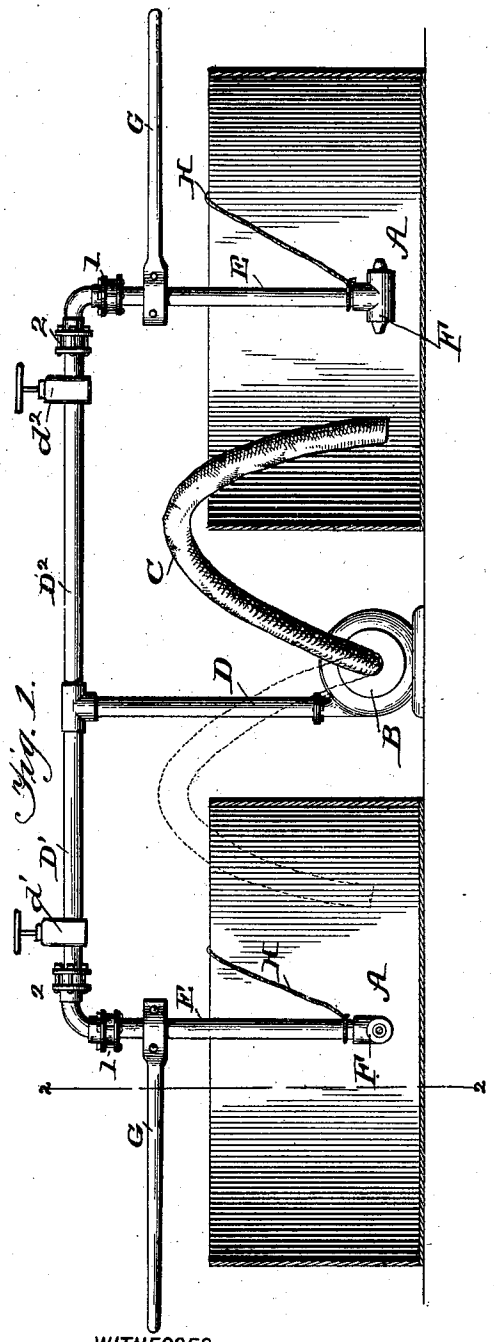



Fig. 1.

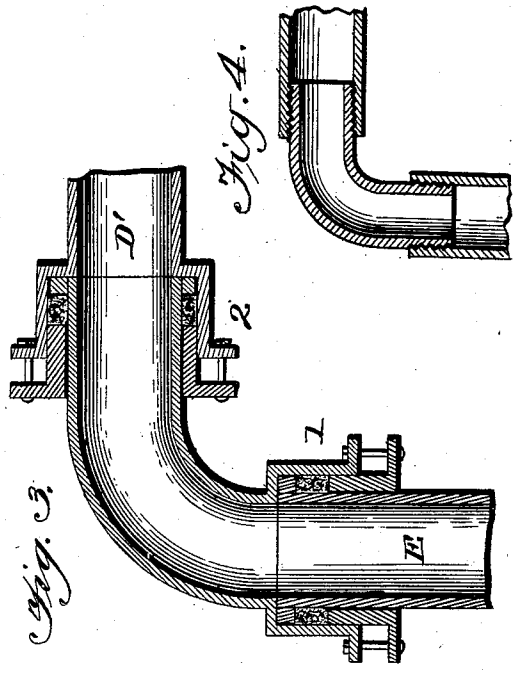



Fig. 3.



Fig. 4.

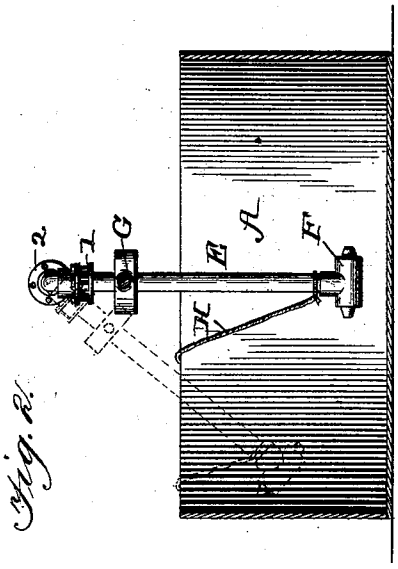



Fig. 2.

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# UNITED STATES PATENT OFFICE.

RALPH L. GRAVES, OF SUMPTER, OREGON.

## ORE-LEACHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 689,799, dated December 24, 1901.

Application filed April 25, 1901. Serial No. 57,434. (No model.)

*To all whom it may concern:*

Be it known that I, RALPH L. GRAVES, residing at Sumpter, in the county of Baker and State of Oregon, have made certain new and useful Improvements in Ore-Separating Apparatus, of which the following is a specification.

My invention is an improvement in apparatus for use in separating ores and by which to effect the recovery of the precious metals from their ores and more especially from slimy ores, and the invention provides means whereby to agitate the pulp in the tank by means of a suitable pump, the suction and discharge of which may both be within the same tank; and the invention consists in certain novel constructions and combinations of parts, as will be hereinafter described and claimed.

In the drawings, Figure 1 is a vertical longitudinal section of an apparatus embodying my invention. Fig. 2 is a detail section on about line 2 2 of Fig. 1. Fig. 3 is a detail sectional view illustrating the form of couplings employed in the discharge-pipes, and Fig. 4 shows a simple threaded form of coupling which may be employed.

In carrying out my invention the pulp is introduced in the tank and a solution of cyanid of potassium or other solvent is added, and then the pump is started and the agitation commences, as will be more fully described.

The tank A may be of the ordinary construction and I may employ a plurality or battery of these tanks. I have shown two tanks A side by side, with the pump B between them, the latter being shown as a centrifugal pump, with the discharge-pipe D leading from it and the supply-pipe C leading to it. The suction-pipe C may be of pipe-valves and hose and is preferably in the form of a flexible hose, so it can be readily shifted from tank to tank and removed from the tanks whenever desired. The discharge-pipe D is provided with branches D′ and $D^2$, leading to the opposite tanks, and each of these branches is provided with a depending discharge-pipe E, provided within the tank with a one or more way nozzle F. The discharge-pipes E are swiveled to their supporting-pipes so they can be turned axially on the joint at 1 and can be swung in a vertical plane on the joint at 2, a lever G being secured to the discharge-pipe so it can be readily turned, and a rope H being connected with said pipe near its lower end so it can be swung up, as indicated in dotted lines, Fig. 2, out of the slime whenever desired. At $d'$ and $d^2$ I provide valves controlling the branches D′ and $D^2$, so the said branches can be shut off whenever desired. If now it be desired to operate within the tank at the right in Fig. 1, the valve $d^2$ may be opened and the valve $d'$ closed and the pump be operated to draw the slime through the suction-pipe C out of the tank and force it through the branch $D^2$, and thence through its discharge-pipe and nozzle back into the tank, effecting a thorough agitation of the slime, and this agitation may be continued as long as necessary. Then the suction-pipe can be raised from the tank and the discharge-pipe swung on its swivel to the dotted-line position shown in Fig. 2, so it will not become choked while the contents of the tank are settling. When the slimes have settled, the clear solution may be drawn off and the precious metals precipitated by any of the well-known methods. I ordinarily use a little lime to settle the slimes.

By means of my apparatus the agitation can be stopped and resumed at pleasure in the same tank, for there is nothing to become clogged when the agitation is stopped. The clear fluid can be drawn from the agitation-tank when desired; but little power is required for the agitation, and by supporting the discharge pipe and nozzle in the manner shown all portions of the contents of the tank can be agitated by properly directing the nozzle, thus insuring a complete agitation of the entire charge of the tank.

The apparatus will be found useful with wet or dry material, and any desired number of tanks can be connected with the same pump by means of the arrangement of the pipes and valves as shown, it being understood that in agitating the contents of one tank the discharge-pipes leading to the other tanks should be shut off by properly manipulating their valves.

In Figs. 1, 2, and 3 the joints at 1 and 2 are secured by means of suitable stuffing-boxes having packing and glands; but manifestly

where desired the L's connecting the horizontal pipes with the vertical discharge-pipes may be connected, as shown in Fig. 4, by ordinary threaded joints and the discharge-pipe be turned or swung on the threads in the manner before described.

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

1. The herein-described apparatus for use in extracting ores, the same consisting of a plurality of tanks, a pump, a discharge-pipe leading from said pump and having a plurality of branches leading to the several tanks and provided each with a discharge-pipe which may be turned axially or swung vertically, valves controlling the several branches, and a flexible supply or suction pipe leading to the pump and arranged to be shifted from tank to tank, levers connected with the several discharge-pipes whereby they may be turned axially, and means connected with the lower ends of the discharge-pipes whereby they may be swung vertically all substantially as and for the purposes set forth.

2. The combination in an apparatus substantially as described of a tank, a pump, a suction or supply pipe leading from the tank to the pump, and a discharge-pipe leading from the pump into the tank and having within the tank a discharge-pipe having supports which permit it to be turned axially or swung vertically substantially as set forth.

3. The combination of the tank, the pump, the suction-pipe leading from the tank to the pump, and the discharge-pipe leading from the pump and having a lateral branch and a depending branch swiveled to the lateral branch whereby it may be swung vertically, the said depending branch being arranged to be turned axially substantially as set forth.

4. The combination with the tank of the discharge-pipe having a lateral branch, an upright branch in the tank, and an L connecting the said branches and arranged to turn relatively to both the said branches whereby to permit the turning and swinging of the upright branch substantially as set forth.

5. The combination of a plurality of tanks, a pump having a supply or suction pipe shiftable from one to the other of said tanks and discharge-pipes leading to the several tanks and provided with valves and with movable discharge branches and with means whereby the latter may be operated substantially as set forth.

6. The combination of the tank, the pump having the supply or suction pipe leading from the tank, and the discharge-pipe leading from the pump to the tank and provided with a depending branch arranged to be rotated within the tank and provided with a nozzle, and the lever fixed to the said rotatable branch whereby the latter may be turned substantially as set forth.

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