

No. 894,254.

PATENTED JULY 28, 1908.

R. S. BROWNE.
CYANID TANK.

APPLICATION FILED JULY 24, 1907.

Fig. 1.

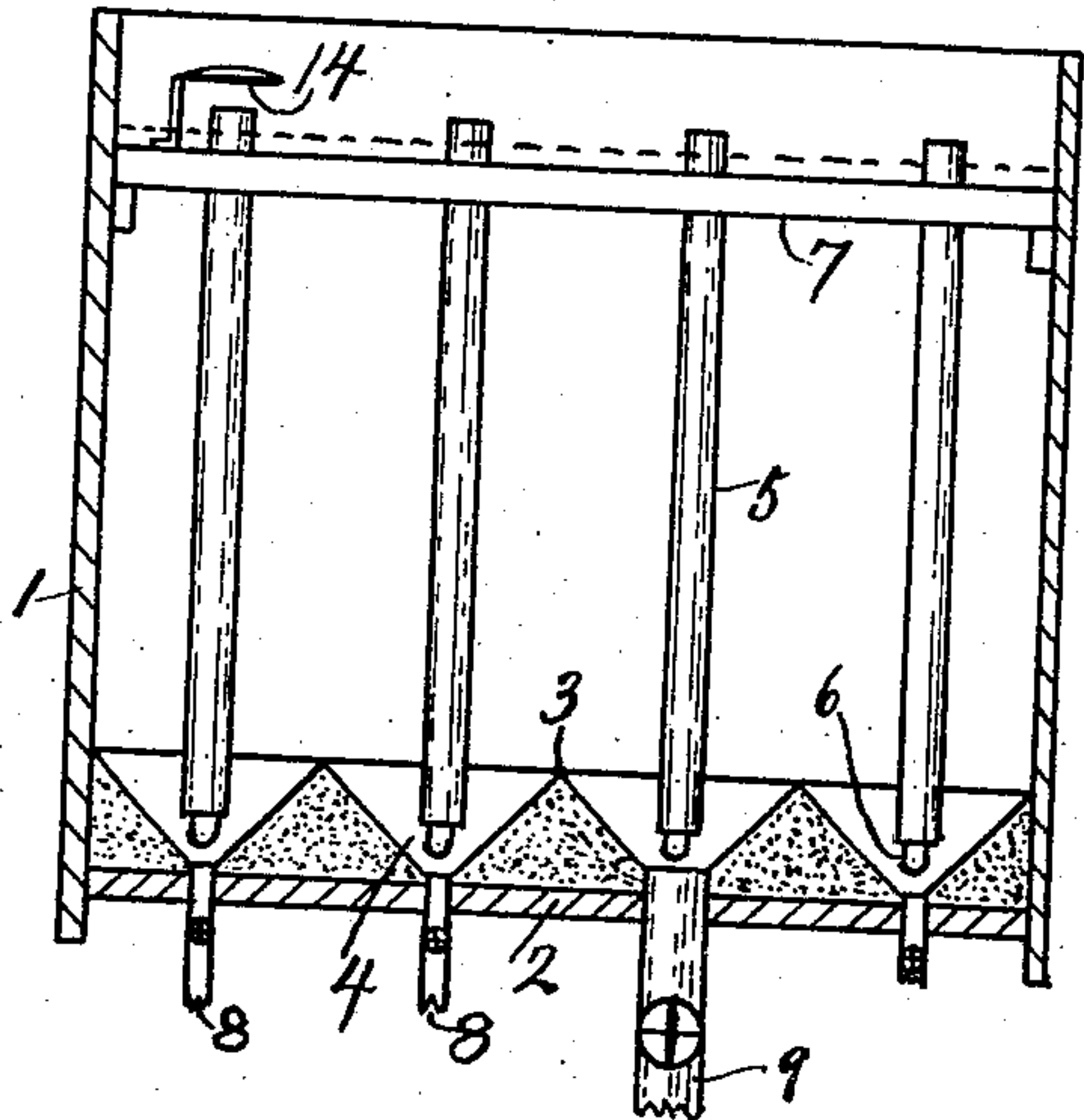


Fig. 3.

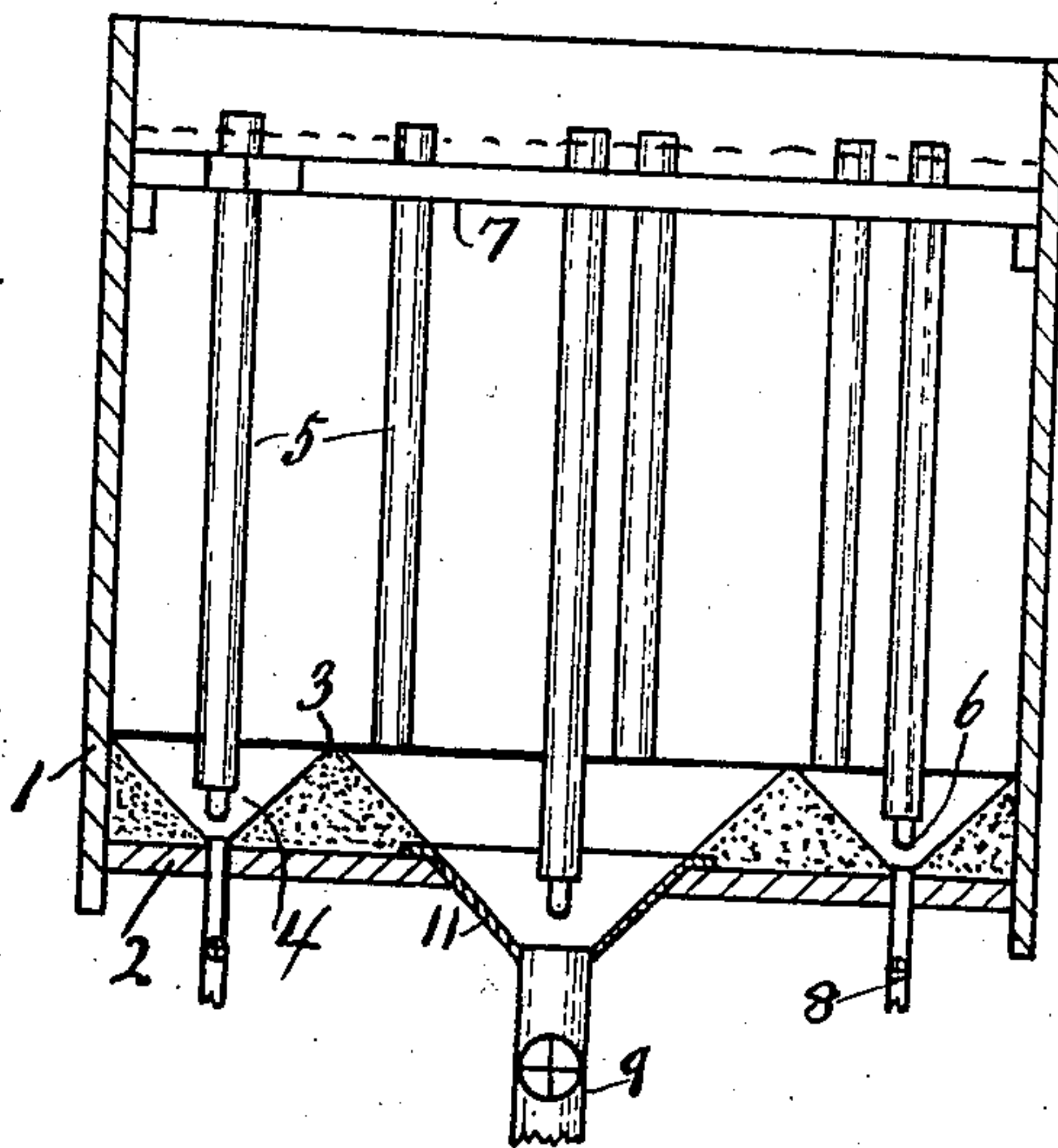


Fig. 2.

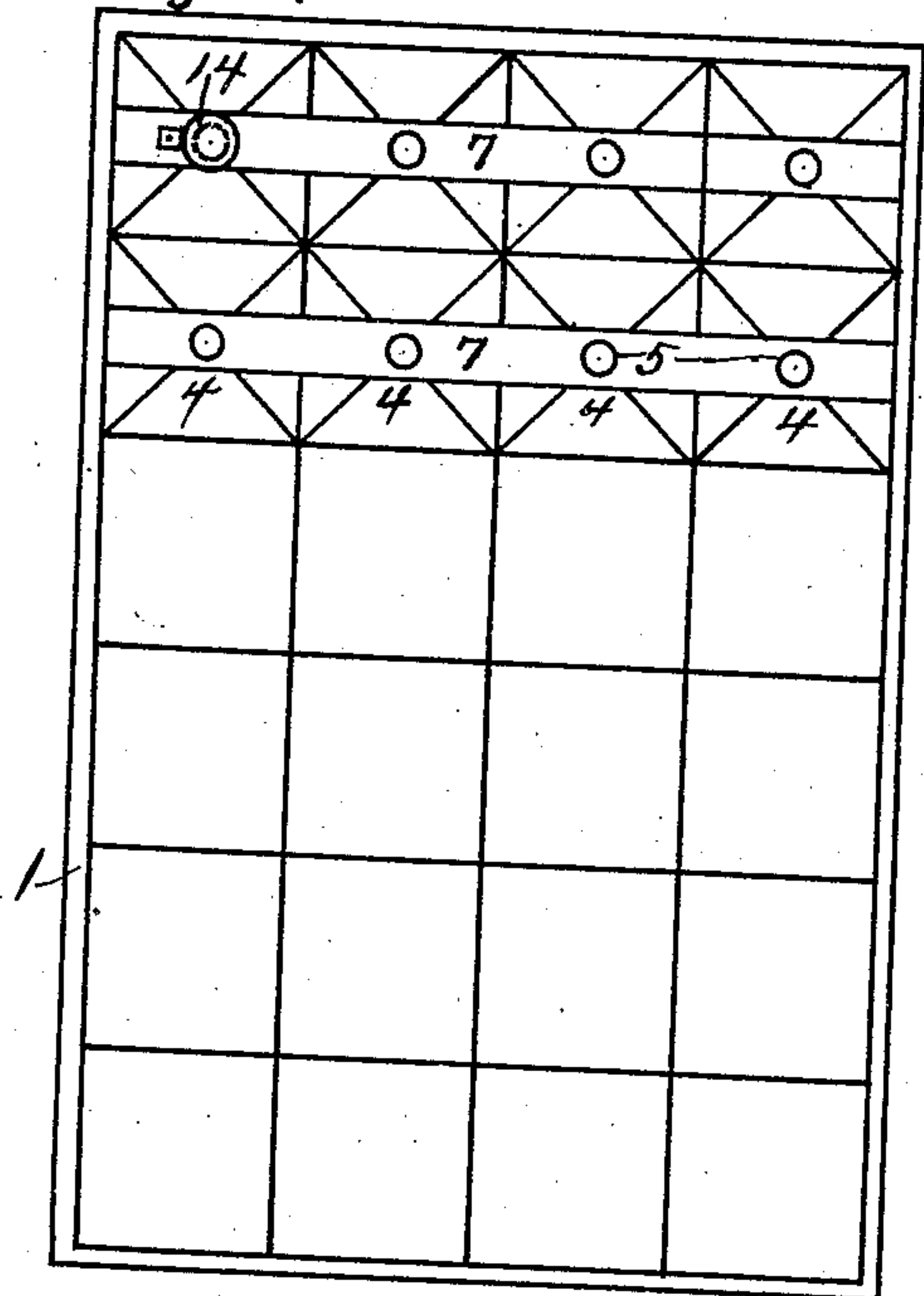


Fig. 4.

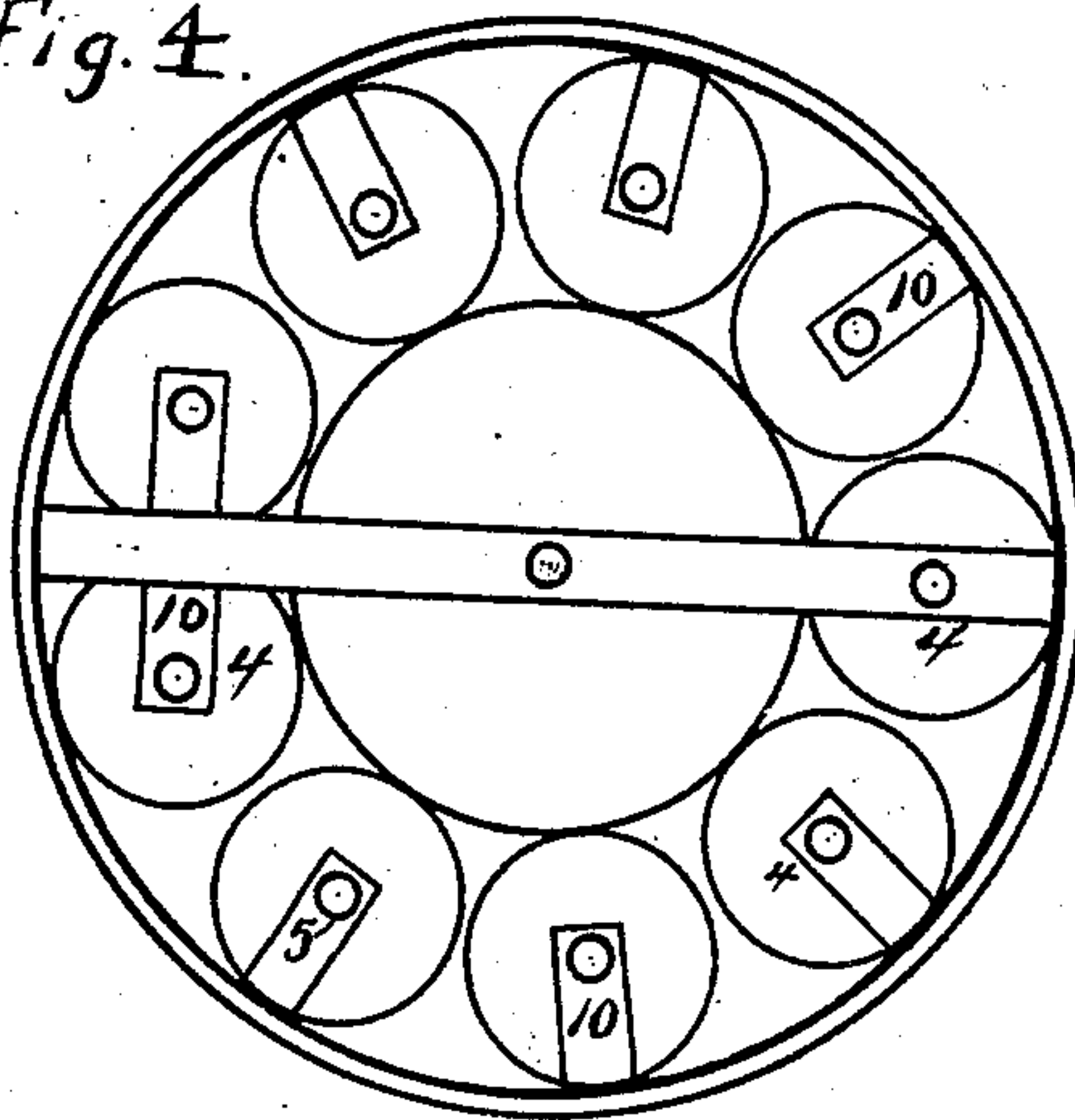
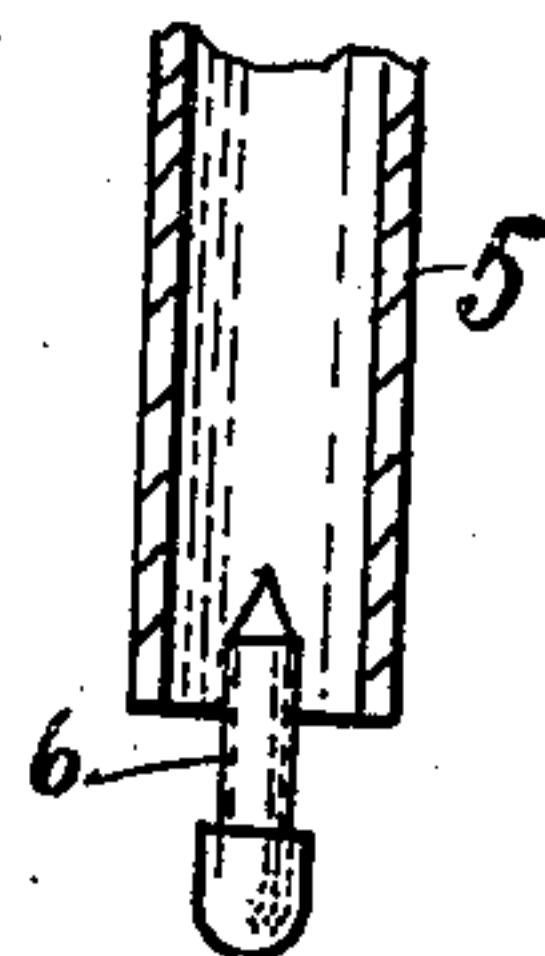


Fig. 5.



WITNESSES:
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UNITED STATES PATENT OFFICE.

RALPH STUART BROWNE, OF ALAMEDA, CALIFORNIA.

CYANID-TANK.

No. 894,254.

Specification of Letters Patent.

Patented July 28, 1908.

Application filed July 24, 1907. Serial No. 385,282.

To all whom it may concern:

Be it known that I, RALPH STUART BROWNE, a citizen of the United States, and a resident of Alameda, county of Alameda, State of California, have invented a certain new and useful Cyanid-Tank, of which the following is a specification in such full and clear terms as will enable those skilled in the art to construct and use the same.

This invention relates to a tank used for the purpose of dissolving gold and silver from the ores thereof by means of the cyanid process.

In the recovery of gold and silver from their ores it is inevitable that large quantities of what are called slimes will be produced. These slimes are simply the ore that has been pulverized to a fineness such as to make the percolation of the water through them impossible. They may be of almost any fineness from 60 mesh to 200 mesh, depending on the kind of ore, and its ability to allow the water to pass through it. Such masses of ore cannot be treated by the percolation process for the recovery of the contained metal for the reason that a stiff clayey mass is formed which the water will not pass through. The particles of gold must come into contact with some of the cyanid solution in order that it may be dissolved, and in order that it may be so dissolved it is necessary to resort to some means of agitation to keep the particles of gold in contact with the cyanid solution long enough to accomplish the desired solution of the metal.

Many devices have been resorted to for the purpose of agitating the solutions, but the mechanical means so far used are very wasteful of power. A modified form of air lift has been used to a certain extent, but it also is wasteful of power for the reason that the circulating pipes used have been so large that the air has not had a chance to properly act on the body of the solution, the bubbles of air simply acting as means whereby a gentle upward motion might be given the solution in the tank. The difficulty with this form of agitator is that since but one lift can be provided for each tank, on account of the large power required to run them, that a special form of tank must be used since the bottom must be of such slope as to prevent the collection of masses of slime in the bottom of the tank. These tanks are in use, but it is very

nearly impossible to make them retain the solution since in the tanks of the size used in cyanid plants, from 18 to 40 feet, it is necessary to make a conical bottom at least 9 to 20 feet below the true tank bottom. Such cones are so large that they are very expensive and only one lift cannot properly take all the solution from a large tank and keep the slime in agitation since they discharge all the solution near the center of the tank thus making practically no circulation near the outer edges of the tank. I have therefore decided to use a series of true air lifts with a series of small pipes in order that the bubbles of air may act as pistons on the mass of solution, a series of small cones being placed within the bottom of the tank, or the cones may be placed partly within and partly without the tank, but in any case they are small enough to avoid the difficulty of leakage due to their large size, and since the agitating currents are spaced apart around the tank there is a perfect circulation of the sludge and it does not drop down in large masses, as is the case with but a single cone.

Another advantage with this system is that the power required is much less than that required when but a single large pipe is used to cause the circulation of the solution in the tanks, since the blast of air from a small nozzle into the circulation pipe does not lose its dynamic energy, as it does in the large pipe, so rapidly.

The chief advantage of this system lies in the fact that when there are a plurality of currents causing the circulation of the solution, at a large number of widely separated points, that any form of tank may be used, and also that the circulation of the solution is complete, as is not the case when there is a single circulating current in the tank. The eddy currents, in the tank assist largely in making more complete the perfect separation of the gold from the ore.

The solution of cyanid referred to is the ordinary cyanid of sodium or potassium.

In the drawings, in which like numerals of reference are applied to like parts throughout, Figure 1 is a sectional elevation of a tank constructed according to my invention, Fig. 2 is a plan of the tank with only a part of the pockets being fully shown, Fig. 3 is a sectional elevation of a round tank constructed according to my invention, Fig. 4 is a plan

of the round tank, and Fig. 5 is a section of the lower end of one of the lift pipes showing the air nozzle.

The tanks are made of any suitable materials, and may even be of concrete, the sides 1 being provided with cleats for the pipe supports 7 and 10. The bottom 2 of the tank is of the common flat type and is in use suitably supported. In the tank are formed the pockets 4, any suitable material 3 being used to give them the required shape. In the bottom of each pocket 4 there is a pipe having a valve for the withdrawal of the solutions, the pipes 8 being small in size and having a small valve while the pipe 9 has a large valve. The reasons for this difference in the size of the valves in the various pipes is that it is necessary to draw the solutions off rapidly, and yet the cost of the tank must not be unduly increased, so a number of small valves are used to empty the pockets themselves while the large valve is used to take the majority of the solution out of the tank.

The pipes are held in their positions by means of the cross bars 7, and in the round tank a series of brackets 10 are used to hold the outer set of pipes. At the bottom of each pocket is placed an air pipe 6 which has a nozzle discharging into the bottom of the small vertical pipes 5. It will be possible to use a small cone 11 below the tank, as shown in Fig. 3, when the cones above the bottom of the tank will be made to meet it, as shown. It is not necessary to have the cones or pyramids exactly touching, since the slimes will themselves make such cones to a certain extent, but it is necessary to have a considerable number of small vertical pipes to give the proper agitation to the solution. Splashers 14 may be used over the pipes.

The operation of the tank is as follows: The tank is run full of solution and the slimes are then agitated by means of the air lifts, the air jets all being started and allowed to run till the necessary time for the solution of the metal has elapsed, when the air is turned off, the slimes are then allowed to settle, or they may be put through any form of filter that may be desired. It will also be ob-

served that tanks built in this manner take up less space vertically than where there is but a single cone for the entire tank bottom.

Having thus described my invention in such full and clear terms as will enable those skilled in the art to construct and use the same what I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a tank for cyanid solution purposes, the combination with a tank of a series of pockets in the bottom of the tank, an air lift in each pocket, and a pipe extending from the air lift to a point near the top of the tank.

2. In a tank for cyanid solution purposes, the combination of a tank, a series of inverted cone like pockets in said tank, a pipe extending to a point near the bottom of each pocket, an air supply pipe adapted to discharge a blast of air in each pipe, and a drawoff valve for each pocket.

3. In a tank for cyanid solution purposes, the combination of a tank, a series of inverted cone like structures in the bottom of the tank, a pipe extending from a point near the top of the tank to a point near the bottom of each pocket, an air supply pipe discharging into each pipe, a discharge pipe for each cone one of said pipes being much larger than all the others, and valves for each discharge pipe.

4. In a tank for cyanid solution purposes, the combination of a tank, a series of inverted cone like structures in the bottom of the tank and substantially covering the base of the tank, a pipe in each cone and extending from a point near the top of the tank to a point near the bottom of each cone, an air pipe discharging in each pipe, a discharge pipe in the bottom of each cone, valves in each discharge pipe one of said valves being much larger than the others.

In testimony whereof I have hereunto set my hand in the presence of the two subscribing witnesses this 15th day of July A. D. 1907.

RALPH STUART BROWNE.

Witnesses:

CARLOS C. GRIFFIN,
EDITH W. BURNHAM.