

R. D. JACKSON.  
SETTLING TANK.

(Application filed Jan. 15, 1902.)

(No Model.)

2 Sheets—Sheet I.

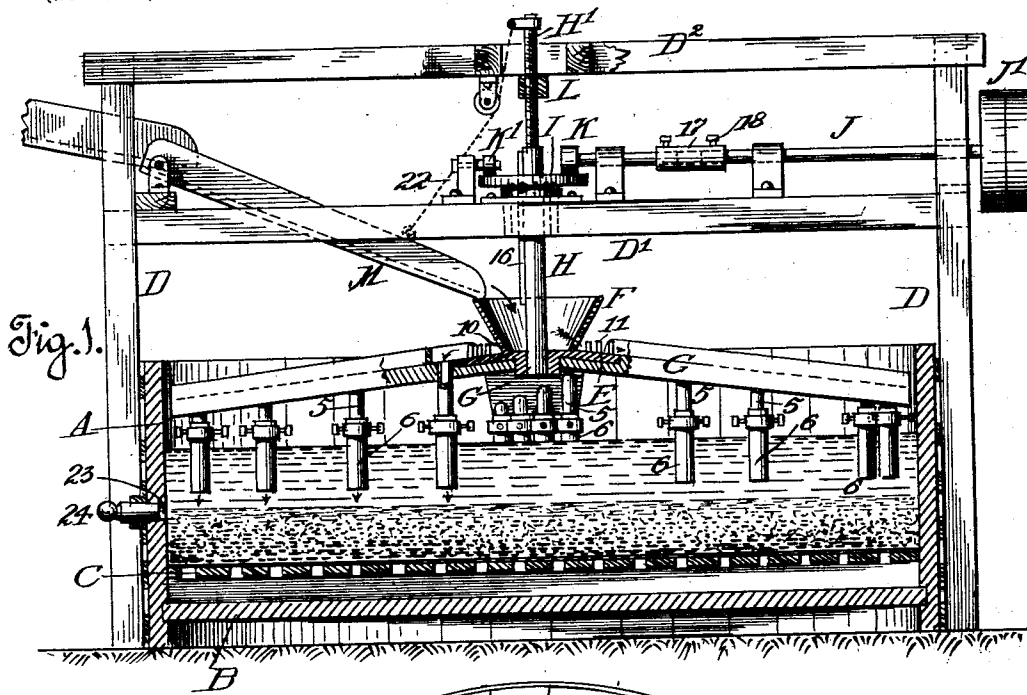


Fig. 1.

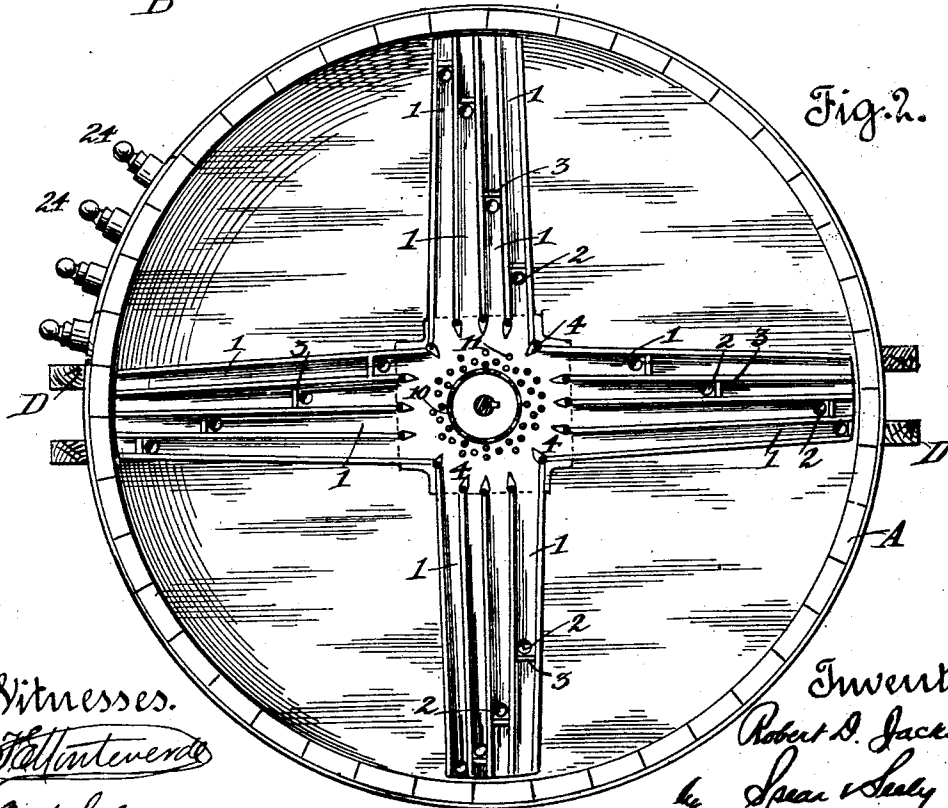


Fig. 2.

Witnesses.  
*Stanton*  
*M. S. Sully*

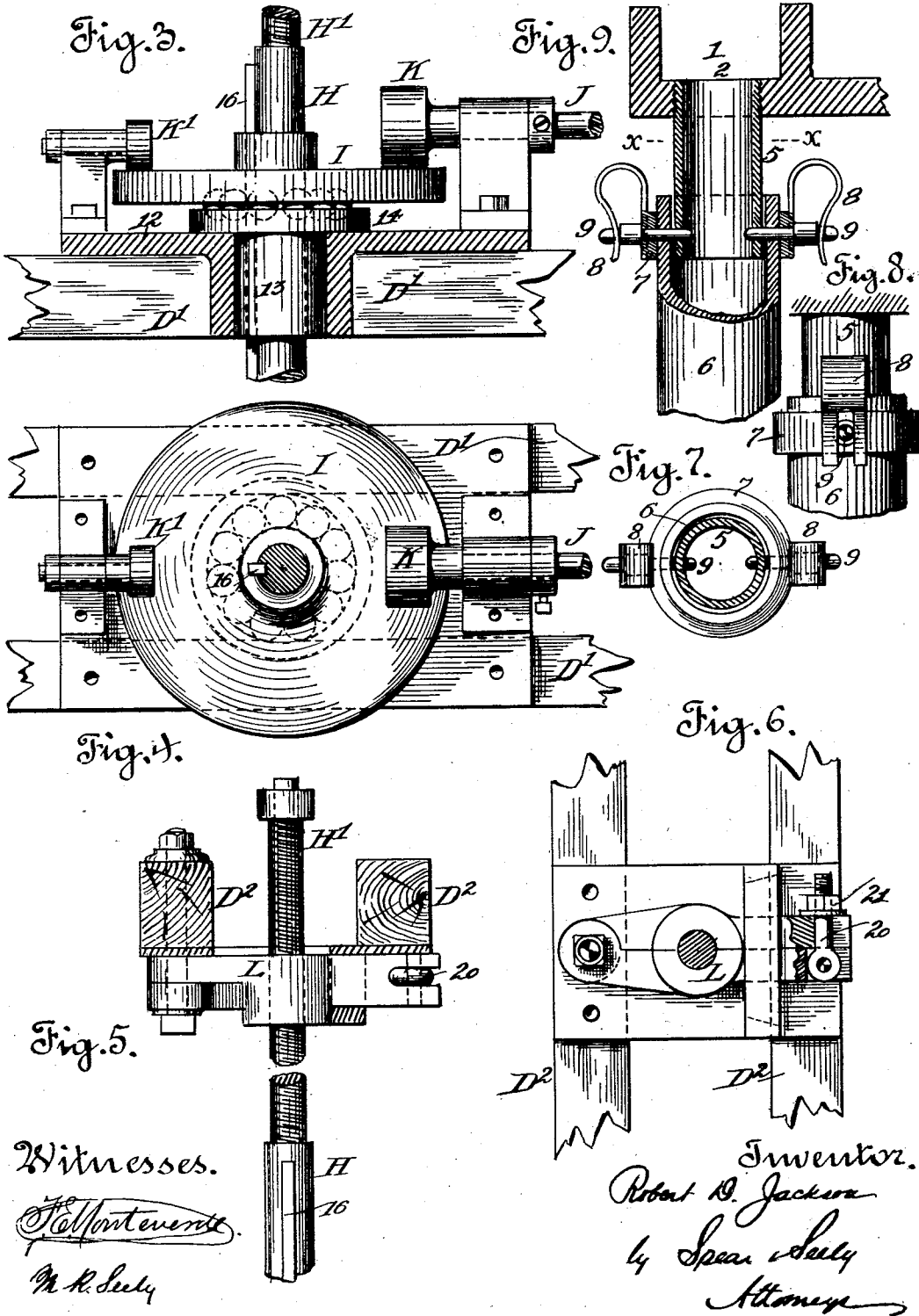
Inventor.  
 Robert D. Jackson  
 by *Spear Sully*  
 Attorney

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Witnesses.  
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# UNITED STATES PATENT OFFICE.

ROBERT D. JACKSON, OF RENO, NEVADA.

## SETTLING-TANK.

SPECIFICATION forming part of Letters Patent No. 710,462, dated October 7, 1902.

Application filed January 15, 1902. Serial No. 89,870. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT D. JACKSON, a citizen of the United States, residing at Reno, in the county of Washoe and State of Nevada, have invented certain new and useful Improvements in Settling-Tanks, of which the following is a specification.

In the treatment of ores by milling processes desirable results as to efficiency and economy would be obtained by leaching the ore direct from the stamp-battery or crushing-machine without the use of separate settling-reservoirs; but the difficulty has been to conduct the water or liquid carrying the pulverized ore directly into leaching-vats and depositing it in such a manner that percolation of the settled pulp by solutions is practicable. If the pulp coming from a stamp-battery or other wet crushing-machine be conveyed to and permitted simply to flow into a vat to settle it, the settled pulp will be found to be deposited in an uneven and irregular manner. The coarser or sandy part will be deposited near the point where the stream falls and the finer farther away. Even if the position of the trough or conveyer be changed in an attempt to deposit the pulp in all parts of the tank there will be formed bunches of sand and seams of fine slime. Such conditions prevent a uniform flow of solutions through the settled pulp and is so objectionable as to have caused the almost universal adoption of the system of first settling the pulp and then shoveling it out and mixing it uniformly before charging it into the vat where it is to be leached, and in some cases the pulp is conducted to reservoirs, where it is permitted to settle, is dried, mixed, and then loaded into the leaching-vats. In both of these procedures there is often a very considerable loss of fine ore, which does not readily settle and passes off in the overflow. These difficulties have been overcome by the invention herein described. In a settling-vat constructed in accordance with said invention the ore as it comes from the crushing machinery is so deposited that the coarse and fine pulp is settled in a uniform mixed condition, there being no strata of coarse or fine, and, moreover, the fine pulp, which is usually

lost in settling, is mostly deposited with the other pulp. The proportion of slime deposited with the sands is entirely under the control of the operator and will of course always be restricted, so that the material settled will be permeable by solutions.

I accomplish the desirable results referred to by an apparatus having an automatically-movable pulp-distributor which is so operated in the settling-tank as to deposit the pulp in a uniform manner.

An apparatus embodying my invention in the form and manner of construction preferred is fully hereinafter described, and is shown in the accompanying drawings, in which—

Figure 1 is a vertical sectional elevation. Fig. 2 is a plan view of the tank proper. Fig. 3 is a side elevation of the frictional gearing for driving the distributor. Fig. 4 is a plan view of the same. Fig. 5 is a plan view of the sectional nut for permitting the descent of the threaded shaft which accomplishes the vertical movement of the rotary distributor. Fig. 6 is a bottom plan of the same. Fig. 7 is a cross-section on line *xx* of Fig. 9. Fig. 8 is an elevation of means for removably attaching the flexible discharge-outlets to the distributor. Fig. 9 is a vertical section of the devices illustrated in Figs. 7 and 8.

The tank A has the usual solid bottom B and slatted false bottom C, the latter having the ordinary porous covering.

D represents a frame shown as composed of vertical posts connected by cross-beams. In this frame is journaled the movable structure which receives the material from the stamp-battery or other crusher and distributes it upon the false bottom of the tank. This movable structure comprises a central plate E, carrying a receiving-hopper F and arms G, of which four are shown and which are inclined downwardly toward the wall of the tank. The upper surface of each arm is formed with longitudinal channels, in each of which is a perforation for discharging the contents. Beyond each perforation is a stop, which closes the channel, or the channel itself can terminate at that point. It is the intention that the holes in these channels

shall be so arranged and spaced that in their combined movement they shall cover the whole surface and deposit the pulp of uniform depth all over the vat. The inlet to each channel from the central plate is provided with an adjustable gate 4, by which the amount of material admitted to said channels can be regulated.

Connected to each perforation 2 is a discharge-tube 5, which supports the flexible and removable discharge-pipe 6. Any detachable connection can be used, and a simple and convenient device is illustrated in Figs. 7, 8, and 9. A ring 7 encircles the flexible tube, to which are secured the springs 8 8. These springs press inwardly upon pins 9 9, which pass through the said ring and the tubes 5 and 6 and keep all parts in engagement. The pins are easily withdrawn after relieving them of the spring-pressure. These flexible tubes receive material from the inclined channels and deliver it upon the false bottom and always below the surface of the water and being flexible will yield and drag over the deposit should they come in contact with it and will not plow through it. The distributor being kept in motion, it is evident that the material supplied and distributed in the channels will thence escape through all the perforations on different concentric lines, so that the distribution is practically uniform throughout the tank. The hopper is provided with a number of discharge-openings 10 around its circumference, and the plate adjacent is rather thickly studded with pins 11 to assist in directing the material uniformly in different directions. The distributor shown has a rotary motion and is secured upon a vertical central shaft H, the upper portion of which is threaded, as shown at H', and which is driven in any suitable way. I prefer the variable-speed friction-gearing shown in Figs. 1, 3, and 4. On the cross-beams D' D' is mounted a plate 12, having a socket for a sleeve 13, formed with a grooved bearing-plate 14. A similarly-grooved friction-disk I revolves on balls in these grooves and is connected to the shaft H by the feather and groove 16, Fig. 4. This connection permits the shaft H to rotate and also to be capable of vertical movement for purposes hereinafter described. The friction-disk derives its rotation from the driving-shaft J, having the power-pulley J' and roller K. The shaft I is made in two parts coupled by the sleeve 17 and set-screws 18, so that the inner member, carrying the driving-roller, can be adjusted to produce variable speed, according as the roller is set nearer to or farther from the center of disk I. A bearing-roll K' is placed opposite roll K to keep the disk level and prevent unequal pressure on the ball-bearing. The automatic vertical movement of shaft H, carrying with it the distributor, is produced by the revolution of the threaded upper part of such shaft in a nut L, secured to the upper cross-beams D'

of the frame. As the shaft and distributor revolve they are gradually and slowly raised, so that the distributor-tubes, while always below the water of the settling material, shall discharge their contents in proximity to the more solid or partially-settled contents of the tank. In order to avoid the necessity of reversing to cause the descent of the distributor, the nut L is split and the parts hinged together and detachably fastened by a bolt 20 and nut 21, Figs. 5 and 6, so that the distributor can be quickly lowered at any time.

The material supplied to the apparatus is delivered to the central hopper through a chute M, which is hinged to the framing, as shown. I prefer to support the chute by a flexible connection 22 to the head of the distributor-shaft, so that it will be raised by and in time with the upward movement of the latter. The vertically-moving parts can be provided with a counterbalance-weight, if desired, so as to prevent the apparatus from falling too suddenly and rapidly.

The liquid forming the upper part of the deposit in the tank is drawn off by the usual openings 23, provided with plugs 24. In operating the settling-vat the surface of the liquid is kept at nearly a constant distance above the bottom of the discharge-tubes until the vat is nearly filled with pulp. Then the surface of the liquid is allowed to remain at a constant level, while the bottoms of the discharge-outlets constantly rise. In this way the floating excess of slime is carried out of the machine, so as to prevent its depositing in an impermeable stratum when the tank is full.

The operation of the apparatus will have been evident to the reader as well as the attendant advantages. The material delivered to the moving distributor escapes in all directions from the hopper and finds its way into the inclined channels. From these channels it escapes and is discharged beneath the surface of the water in lines which practically include the whole area of the tank and make the deposit practically uniform. The speed of rotation is regulated according to the quantity and character of the supply, and the rise of the distributor is proportioned to the speed. The result is that at the bottom of the tank, instead of a bunched or streaky deposit, I have practically a uniform homogeneous mass, which can be uniformly permeated by the leaching solution.

In my apparatus I do not limit myself to exact details of construction herein described, and shown in the drawings, as I desire to avail myself of such modifications and equivalents as fall properly within the spirit of my invention.

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

1. In a settling-tank, a movable distributor having a receptacle or hopper, inclined chan-

nels extending from said receptacle, and a plurality of discharge-outlets from said channels.

2. In a settling-tank, a rotary distributor 5 inclined from the center outwardly and downwardly, and having discharge-orifices at unequal radial distances from such center.

3. In a settling-tank, a rotary distributor 10 comprising a number of radial inclined arms, having superficial channels and a discharge-outlet from each channel.

4. In a settling-tank a distributor movable 15 in the tank and having discharge-tubes adapted to discharge below the surface of the liquid in the tank.

5. In a settling-tank a movable distributor for pulp having flexible discharge-tubes.

6. In a settling-tank, a rotary distributor 20 having a central receptacle, channels extending outwardly from said receptacle, discharging-outlets from said channels, and tubes depending from said discharge-outlets toward the bottom of the tank.

7. In a settling-tank, a rotary distributor 25 comprising radial arms having superficial channels, discharge-outlets from said channels, and flexible tubes detachably connected to said outlets.

8. In a settling-tank, a central hopper, a 30 plate upon which said hopper is mounted,

distributing-channels extending from said plate, and pins projecting from said plate adjacent to the hopper.

9. In a settling-tank a distributor for pulp, 35 having outlets adapted to discharge below the surface of liquid in the tank, in combination with means for imparting to said distributor a combined horizontal and vertical motion.

10. In a settling-tank a distributor for pulp 40 having outlets adapted to discharge below the surface of liquid in the tank, in combination with means for imparting to said distributor a combined horizontal rotary and rectilinear vertical motion. 45

11. In a settling-tank a distributor having 50 downwardly-extending discharge-outlets for pulp and liquid, means for supplying material to said distributor, means for rotating said distributor, and means for raising said distributor while rotating; whereby the distributor rises steadily above the accumulating deposit.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 55 6th day of January, 1902.

ROBERT D. JACKSON.

Witnesses:

L. W. SEELY,  
M. R. SEELY.