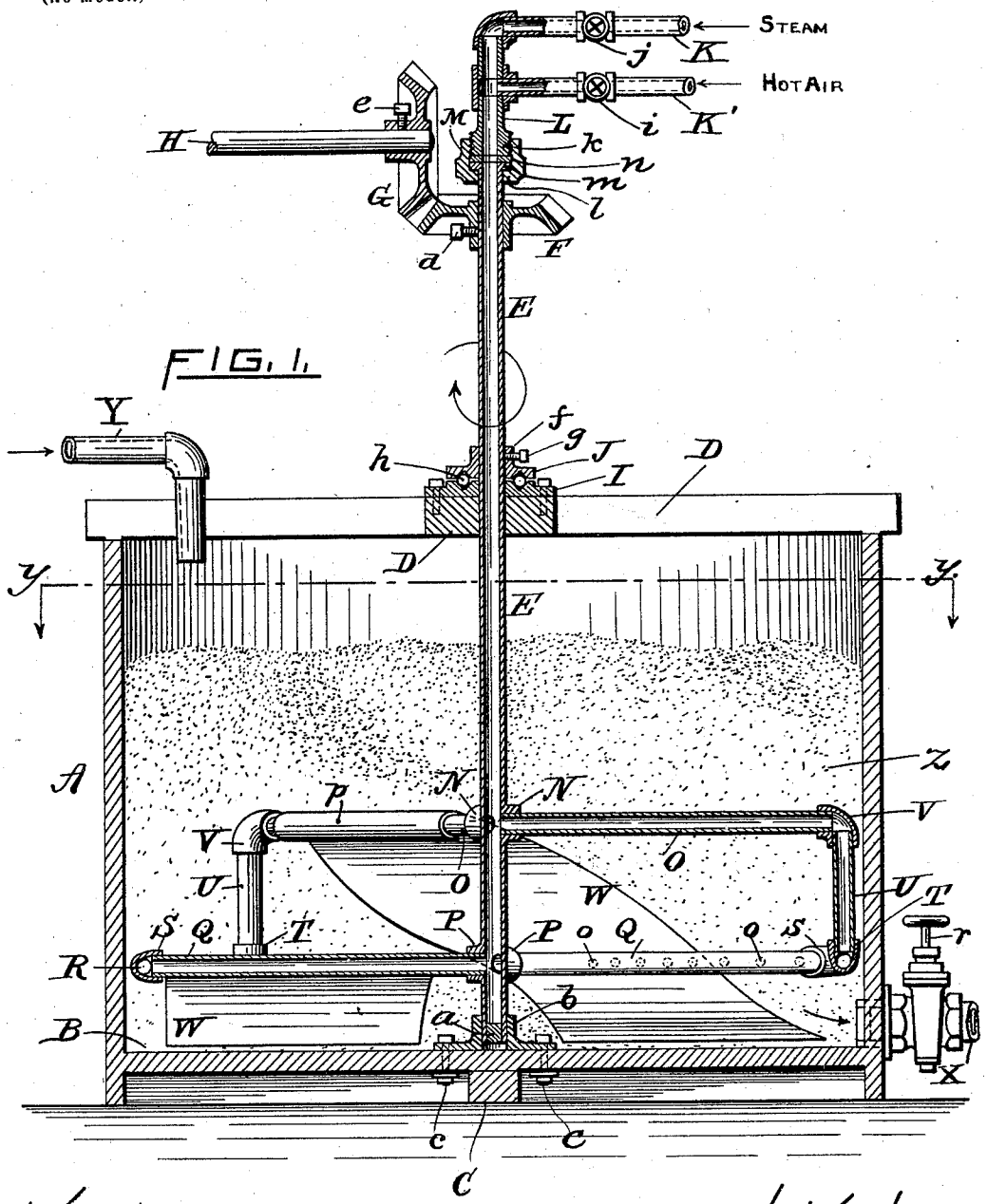
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ORE SEPARATOR.

(Application filed Apr. 30, 1901.)

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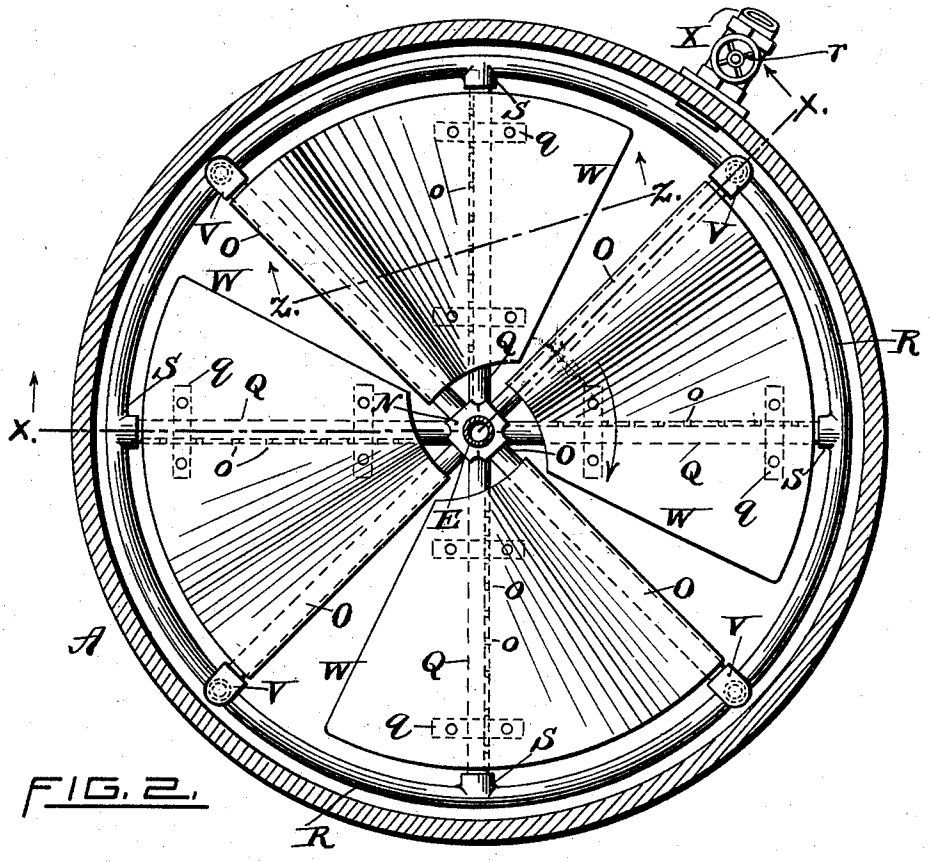


FIG. 2.

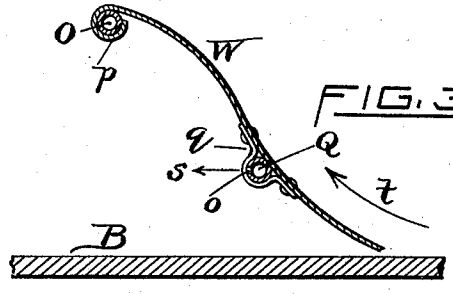


FIG. 3.

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INVENTOR.

Adelbert J. Perry.

By Charles T. Hannigan.

Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ADELBERT J. PERRY, OF PROVIDENCE, RHODE ISLAND.

ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 683,412, dated September 24, 1901.

Application filed April 30, 1901. Serial No. 58,205. (No model.)

To all whom it may concern:

Be it known that I, ADELBERT J. PERRY, a citizen of the United States of America, whose post-office address is 123 Elmwood avenue, in the city and county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Leaching Apparatus, of which the following is a specification.

My invention relates to an improved mechanism for washing ore, of that class of machines which receive the ore in a pulverized state and mixed with a solution of cyanid, whereby the metal is dissolved by it.

The object of my invention is to introduce a mixture of steam and air in the pulp, whereby the precious metal receives a quick chemical action, with the result that considerable time is gained over the method heretofore employed.

With this end in view my invention consists in the novel construction and combination of parts hereinafter described, and specifically set forth in the claims.

Figure 1 is a view of my improved ore-separator, partly in elevation and partly in vertical section, as seen in line $x\,x$ of Fig. 2. Fig. 2 is a top plan view of the same as seen in line $y\,y$ of Fig. 1. Fig. 3 is a sectional detail view as seen in line $z\,z$ of Fig. 2.

Similar letters of reference indicate similar parts in the different views of the drawings.

In the drawings, A represents a circular tub having the bottom B and the central block C.

D D are cross-pieces extending across the top of said tub.

E is a vertical tube or pipe properly supported, plugged at the bottom, as seen at a, where it is mounted in the step b, the latter being fastened to the bottom B of the tub by means of the bolts $c\,c$, as shown in Fig. 1. A bevel-gear F is fastened on the pipe E by the set-screw d and is driven by a bevel-gear G, which is fastened on the shaft H by the set-screw e. A circular bearing-plate I is bolted to the cross-pieces D D at the intersection thereof and is made with an annular channel and a circular central aperture. A bearing-plate J, having a tubular hub f and an annular channel, is fastened to the pipe E by the set-screw g, and balls h in the annular channels of the bearing-plates I and J are provided to reduce friction of the upper bearing in revolving upon the lower bearing.

K and K′ are pipes having therein the valves j and i, respectively. A pipe or tube L extends at a right angle therefrom and has an enlarged end k, with an exterior screw-thread thereon. The pipe L opens into the pipes K and K′, as shown in Fig. 1.

M is a tubular coupling having an inwardly-directed annular flange l, having a central aperture and provided with an interior screw-thread, by which it is engageable with the screw-threaded enlarged end k of the pipe L. The upper end of the pipe E has the outwardly-extending annular flange m resting upon the inner surface of the annular flange l of the coupling M, and a packing-ring n is placed between the upper surface of the annular flange m of the pipe E and the end of the pipe L, as shown in Fig. 1. It is thus seen that the pipe E passes through the central aperture of the flanged end of the coupler M and through the central aperture of the bearing-plates I and J and is adapted to be rotated by power from the shaft H through the beveled gears G F.

Upon the pipe E is the hub N, having four equispaced openings on its sides, as shown in Fig. 2, in each of which openings is inserted a pipe O, and upon the pipe E is also a similar hub P, having four equispaced openings on its sides, in each of which openings is inserted a pipe Q. A circular pipe R has branches S to receive the outer ends of the pipes Q and branches T to receive the lower ends of the pipes U, the latter being connected by elbows V to the outer ends of the pipes O. The pipes Q are provided with a row of small perforations o, as shown.

On each side of the four pipes O is mounted a curved and inclined scraper or blade W, which has its upper end bent over into a tubular form, as shown in detail at p in Fig. 3, and a properly-bent supporting-piece q, riveted to the blade W, holds said blade to the pipe Q.

An outlet-pipe X opens from the tub A at one side near the bottom and is provided with a stop-cock r.

From a stock-tank (not shown) containing a supply of cyanid solution a pipe Y leads

and is made to enter the top exposed end of the tub A, as indicated in Fig. 1.

Having thus described the several parts of the said device, I will now proceed to explain its operation.

The ore to be separated and which has been reduced to a pulverized condition is put into the tub A and is indicated as Z in Fig. 1. The shaft H, rotated by power, imparts, by means of the beveled gears G and F, a rotary movement to the pipe E and the pipes O, Q, R, and U, connected therewith, as shown. Steam from a suitable boiler (not shown) is admitted into the pipe K through the valve *j* and passes through the pipes L, E, O, U, Q, and R. Hot air from a compressor (not shown) is admitted into the pipe K′ through the valve *i* and mingles with the steam in said pipes, and this combination of air with steam produces a mixture of steam and air. A cyanid solution from a suitable stock-tank passes through the pipe Y and mingles with the ore Z, making the same a mass of pulp, and the admission of a mixture of steam and air is discharged through the perforations *o* of the pipes Q in small jets in the lower portion of the mass of ore. As will be seen in Fig. 3, these jets from the perforations *o* of the pipes Q are directed toward the rear, as indicated by the arrow *s* in said figure, while the scrapers or blades W are moving in the opposite direction, being supported by the pipes O and Q. This movement of the scrapers or blades W causes the pulverized ore to move up thereon in the direction indicated by the arrow *t* in Fig. 3, and the mixture of steam and air permeates the pulp as the cyanid solution dissolves the mass, with the result that a very quick chemical action is obtained upon the precious metal. When the machine has been worked long enough to separate the ore from the gangue, the mass flows out through the outlet-pipe X to a filter, (not shown), provided with the usual means of precipitation.

The principle of this invention is to separate and wash out the ore from the pulverized mass of material in the tub, so that by discharging a mixture of steam and air under pressure into said mass, together with a cyanid solution in the same, gives a chemical action to cause the precious metal to quickly separate from the mass, and the thorough mixing and constant agitation of the mass and permeating it with forcible jets of a mixture of steam and air result in an extraction of the ore more quickly than by other methods commonly employed.

Having described my invention, what I claim is—

1. In a leaching apparatus, the combination of a receptacle for holding pulverized ore, a vertical steam-pipe rotatably mounted in said receptacle by proper supports and having its lower end closed, means adapted to impart a rotary movement to said pipe, radial horizontal pipes opening from said vertical pipe and provided with perforations, radial arms extending horizontally from said vertical pipe, inclined blades or scrapers supported by said radial arms and extending close to the bottom of said receptacle, an inlet-pipe in the top of said receptacle, and an outlet-pipe extending from said receptacle at or near the bottom thereof, substantially as shown.

2. In a leaching apparatus, the combination of a receptacle for holding pulverized ore, a vertical steam-pipe centrally mounted in said receptacle by proper supports and having its lower end closed, means adapted to impart a rotary movement to said pipe, a series of radial horizontal pipes opening from said vertical pipe, a second series of radial horizontal pipes opening from said vertical pipe and arranged in a plane below said first series and parallel therewith and provided with perforations, a circular pipe into which the radial pipes of said second series open, a plurality of vertical pipes connecting the radial pipes of the first series with said circular pipe, an inclined scraper or blade mounted on each of said upper radial pipes and supported by the companion lower radial pipe and extending close to the bottom of said receptacle, an inlet-pipe in the top of said receptacle, and an outlet-pipe extending from said receptacle at or near the bottom thereof, substantially as described.

3. In a leaching apparatus, the combination of a receptacle for holding pulverized ore, a vertical pipe centrally mounted in said receptacle by proper supports and having its lower end closed, means adapted to impart a rotary movement to said vertical pipe, a pipe adapted to supply to said pipe steam under pressure from a proper source, a pipe adapted to supply hot air from a proper source to the said first-named pipe, a series of radial horizontal pipes opening from said vertical pipe, a second series of radial horizontal pipes opening from said vertical pipe and arranged in a plane below said first series and parallel therewith and provided with perforations, a circular pipe into which the radial pipes of said second series open, a plurality of vertical pipes connecting the radial pipes of the first series with said circular pipe, an inclined scraper or blade mounted on each of said upper radial pipes and supported by the lower companion radial pipe and extending close to the bottom of said receptacle, an inlet-pipe in the top of said receptacle, and an outlet-pipe extending from said receptacle at or near the bottom plane thereof, substantially as specified.

4. In a leaching apparatus, the combination of a receptacle for holding pulverized ore, a vertical pipe centrally mounted in said receptacle by proper supports and having its lower end closed, means adapted to impart a rotary movement to said vertical pipe, a pipe adapt-

ed to supply to said pipe live steam from a proper source, a pipe adapted to supply hot air from a proper source to the first said pipe, a series of radial horizontal pipes opening from said vertical pipe and provided with perforations, means adapted to agitate and stir said pulverized ore, an inlet-pipe adapted to discharge a chemical solution in said pulverized ore, and an outlet-pipe extending from said receptacle at or near the bottom end thereof, substantially as set forth.

5. In a leaching apparatus, the combination of a receptacle for holding pulverized ore, a rotatable agitator mounted in said receptacle and having a series of radial horizontal pipes perforated at one side thereof, a series of scrapers or blades mounted on said agitator and inclined opposite of the perforations of said pipe, and a rotatable pipe adapted to discharge a mixture of steam and air, from a proper source, through the perforations of said pipe into said pulverized ore, as set forth.

6. In a leaching apparatus, the combination of a receptacle for holding pulverized ore, an agitator mounted in said receptacle and having a series of radial horizontal pipes each provided with a series of perforations at one side thereof, a series of scrapers or blades mounted on said agitator, a pipe adapted to supply to said agitator a mixture of steam and air from a proper source, and means adapted to rotate said agitator whereby the discharge of steam and air through the perforations of said pipes is directed toward the rear while the said scrapers or blades are moving in the opposite direction, as set forth.

7. In a leaching apparatus, the combination of a receptacle for holding pulverized ore, an agitator having a series of radial horizontal pipes integral therewith and provided each with a series of perforations at one side thereof, a series of blades carried by said agitator each of which blades bears against the side opposite the perforations of said pipes, a vertical pipe centrally mounted and rigidly secured to said agitator and communicating with each of the perforated pipes of the same, a pipe adapted to supply to said vertical pipe steam from a proper source, a pipe adapted to supply to said vertical pipe hot air from a proper source, with means adapted to impart a rotary motion to said vertical pipe, so constructed and arranged that the steam and hot air are discharged in jets through the perforations of said horizontal pipes into said pulverized ore while the blades are moving in the opposite direction, substantially as shown and described.

8. In a leaching apparatus, the combination of a receptacle for holding pulverized ore, an agitator adapted to impart motion to said pulverized ore in said receptacle, an inlet-pipe in the top of said receptacle, an outlet-pipe extending from said receptacle at or near the bottom thereof, a steam-pipe adapted to discharge steam into said pulverized ore, and a pipe adapted to supply to said steam-pipe hot air from a proper source, substantially as described.

9. In a leaching apparatus, the combination of a receptacle for holding pulverized ore, an agitator adapted to impart motion to said pulverized ore in said receptacle, an inlet-pipe in the top end of said receptacle, an outlet-pipe extending from said receptacle at or near the bottom thereof, a perforated steam-pipe adapted to discharge steam into said pulverized ore, and a pipe adapted to discharge hot air under pressure into said steam-pipe, substantially as specified.

10. The improved leaching apparatus herein described, consisting of the tub A having the outlet-pipe X and the inlet-pipe Y, the pipes K and K′ having the valves *j* and *i*, respectively, said pipes communicating with the branch pipe L, the vertical pipe E having a flange *m* and a closed lower end, the coupling M attached to the pipe L and having the annular flange *l*, the hub N upon the pipe E having four side openings, the pipes *o* inserted in said hub N, the hub P upon the pipe E having four side openings, the perforated pipes Q inserted in said hub P, the circular pipe R having the branches S into which the pipes Q, respectively, enter and also having the branches T, the pipes U entering the branches T, the elbows V connecting the pipes U and the pipes O, the curved inclined blades or scrapers W mounted on the pipes O, respectively, the shaft H rotatable by power and having the beveled gear G, and the beveled gear upon the pipe E and engageable with the beveled gear G, all combined and operating substantially as shown and for the purpose specified.

Signed by me at Providence, Rhode Island, this 29th day of April, 1901.

ADELBERT J. PERRY.

Witnesses:
HENRY DUNNELL,
W. P. ARNOLD.