No. 726,802. PATENTED APR. 28, 1903.

B. T. NICHOLS.

ORE TREATING PROCESS.

APPLICATION FILED OCT. 10, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

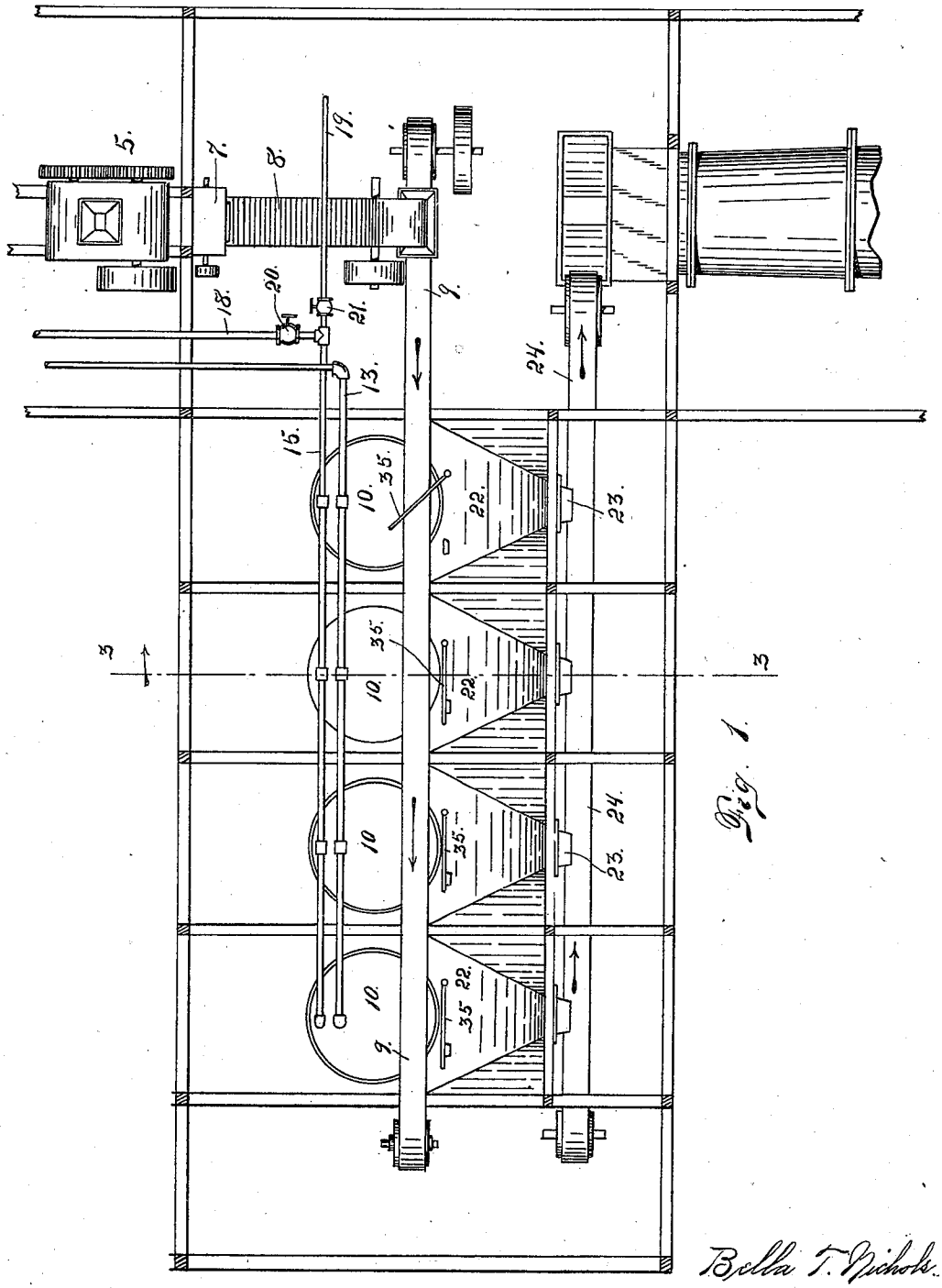


Fig. 1.

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

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NO MODEL. 4 SHEETS—SHEET 2.

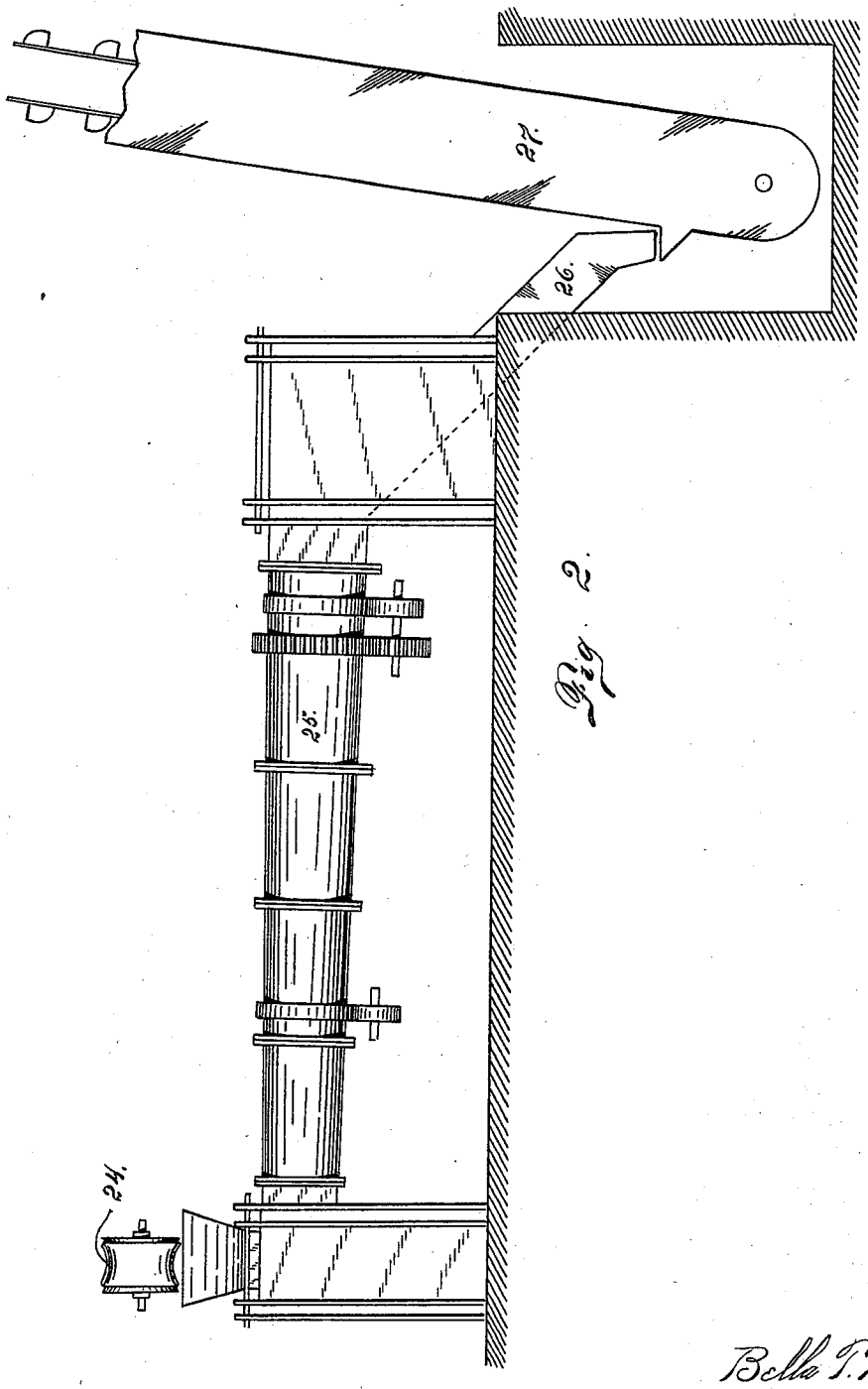


Fig. 2.

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NO MODEL. 4 SHEETS—SHEET 3.

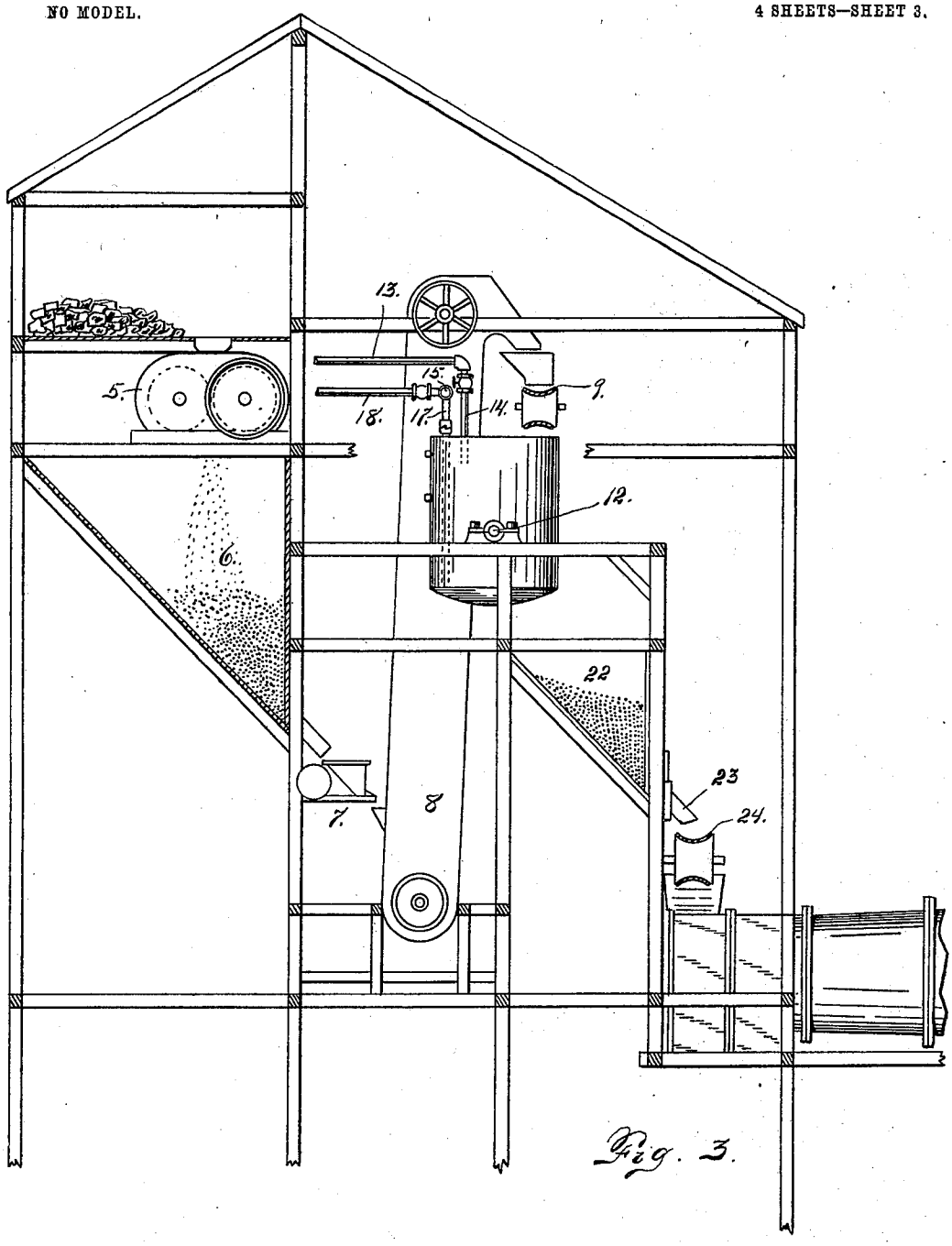


Fig. 3.

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NO MODEL. 4 SHEETS—SHEET 4.

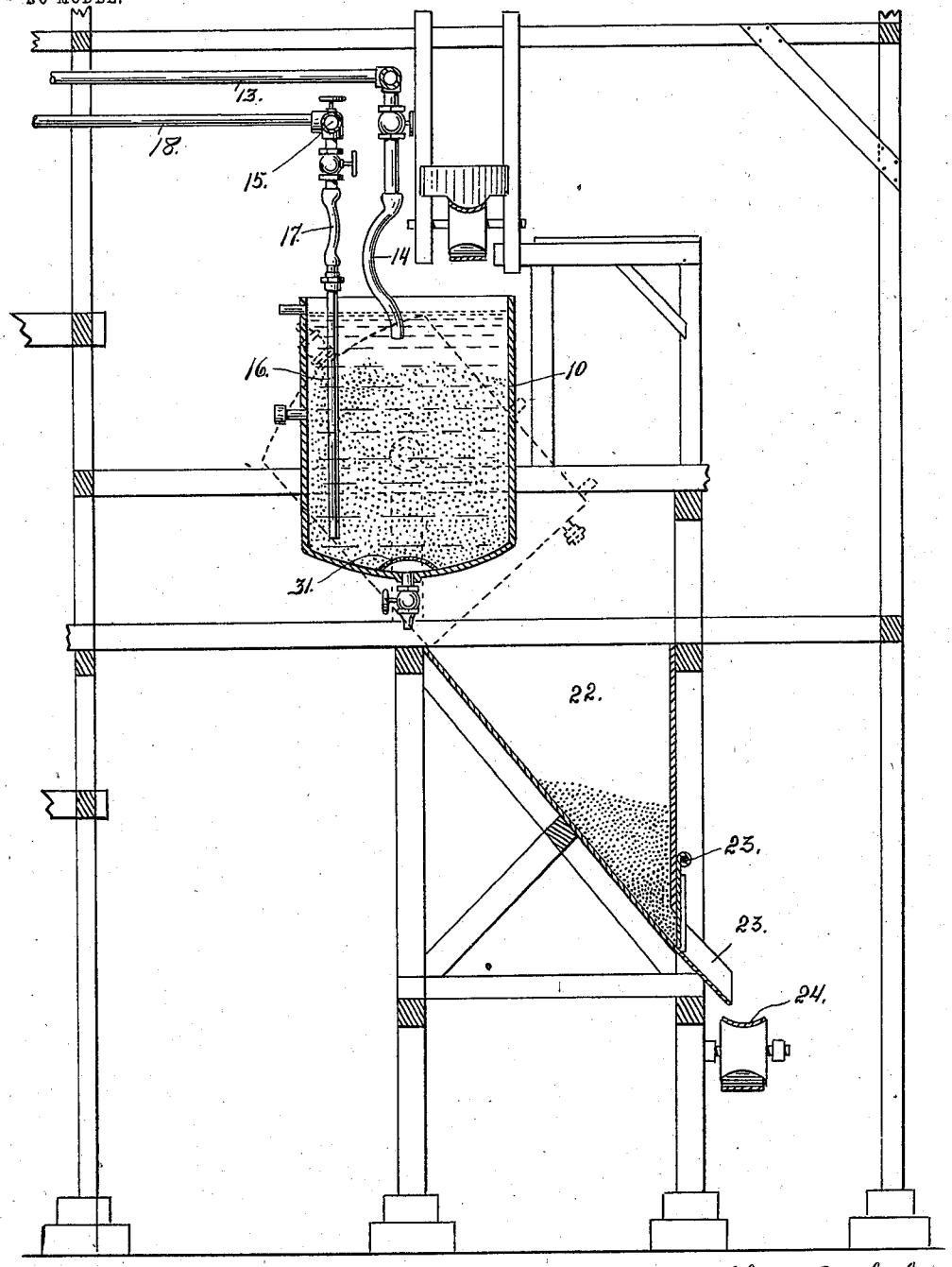


Fig. 4.

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UNITED STATES PATENT OFFICE.

BELLA THOMAS NICHOLS, OF MONTEVISTA, COLORADO.

ORE-TREATING PROCESS.

SPECIFICATION forming part of Letters Patent No. 726,802, dated April 28, 1903.

Application filed October 10, 1902. Serial No. 126,689. (No specimens.)

To all whom it may concern:

Be it known that I, BELLA THOMAS NICHOLS, a citizen of the United States of America, residing at Montevista, in the county of Rio Grande and State of Colorado, have invented certain new and useful Improvements in Ore-Treating Processes; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to an improved method or process of treating ore preparatory to leaching or dissolving its metallic values by any of the well-known processes.

My improved process, briefly stated, consists of the following steps: The ore after being suitably pulverized is mixed with lime. Water is then applied in sufficient quantity to form a pulp of moderate consistency. This pulp is then agitated by the introduction of steam and maintained at a suitable temperature, preferably 90° Fahrenheit, approximately, for a suitable period, preferably about twenty hours. More water is then applied and agitation continued, preferably by the introduction of air, until the ore is thoroughly washed. The pulp is then deprived of its liquid as far as may be made by draining, the air-pressure being preferably applied to facilitate the draining operation, and finally the ore is subjected to drying, whereby it is deprived of its remaining moisture and acid impurities.

In the carrying out or practicing of my improved process a number of mechanical elements are required. In the accompanying drawings suitable mechanism for accomplishing this result is illustrated. It must be understood, however, that in the practice of the invention I am not limited to the use of any special mechanical appliances.

In the drawings, Figure 1 is a top or plan view of the apparatus, the drier being partly broken away. Fig. 2 is a side elevation of the same. Fig. 3 is a section taken on the line 3 3, Fig. 1. Fig. 4 is an enlarged sectional view of a portion of the mechanism shown in Fig. 3.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a crusher in which the ore is suitably pulverized or reduced to the desired fineness for the purpose. Located below the crusher is a bin 6, into which the ore as it leaves the crusher passes and in which it is mixed with the necessary lime. From this bin the ore and lime pass to a feeder 7, thence to an elevator 8, by which it is carried upwardly and delivered upon an endless conveyer 9, which carries it in the direction indicated by the arrow to the tanks 10, the latter being trunnioned below their centers, as shown at 12, to facilitate dumping. The necessary water is carried to the tanks by a conduit 13, with which is connected a flexible part 14 for discharging the water into each individual tank. The steam or air, as may be required, is carried to the tanks from a conduit 15, and with which is connected a pipe 16, attached to each tank by a flexible part 17, which may be detached whenever it is necessary to dump the tank. The steam is delivered to the conduit 15 from a pipe 18, while the air is delivered to the same conduit from a pipe 19. The pipes 18 and 19 are provided with valves 20 and 21, whereby they may be opened and closed at pleasure. Below and at one side of each tank is located a bin 22, into which ore may be dumped from the tank and from which it may be fed by way of a chute 23 to a carrier 24, by which it is delivered to a rotary drier 25, whence it is discharged by way of a chute 26 to an elevator 27, which delivers it at any desired point preparatory to treatment or leaching.

In practicing my improved process the lime and ore are mixed together previous to their discharge into the tanks 10, after which the necessary water is supplied from the pipe 13. Steam is then introduced, being discharged into the tank by the pipe 16, whereby the pulp is kept at a temperature of 90° Fahrenheit, approximately. This feature of maintaining the ore during the agitating operation at the said temperature, or thereabout, is necessary in order to remove the impurities from the ore under treatment. The object of the agitation is to bring the solution containing lime into intimate contact with

the ore particles, whereby the impurities which retard leaching may be removed; but this cannot be effectively accomplished without maintaining the ore at the proper temperature, which, as before stated, is accomplished by the introduction of steam, the latter performing both the agitating and heating function. During the agitation, as aforesaid, the acids and other impurities which retard leaching are freed from the ore, but in order to finally remove or separate them therefrom the ore must be subjected to a washing operation. This is done by the introduction of more water, making the pulp comparatively thin, after which the pulp is subjected to further agitation by the introduction of air. The liquid is then drawn off from each tank by opening a valve 30 in its bottom. The opening in the bottom of the tank is covered by a screen 31 to prevent the escape of the ore with the liquid. In order to facilitate the drawing off of the liquid, the pulp is subjected to the action of air introduced under increased pressure as compared with the pressure employed during the washing operation. In order to further and fully remove the dissolved impurities, the ore is subjected to a drying operation, sufficient heat being provided for the purpose. This drying operation is accomplished while the ore is traveling through the rotary conveyer illustrated in the drawings, the heat preferably moving in the opposite direction to the traveling ore and maintained at about 90° Fahrenheit, whereby the moisture and volatile gases which retard leaching are removed. This drying step is very important and absolutely essential in order to obtain the best results.

Attention is called to the fact that the material to be treated is removed from the conveyer 9 by means of hinged arms 35, which are thrown out in succession to the position shown above the tank 10 farthest to the right in Fig. 1. After filling the first tank the arm 35 adjacent the tank is returned to the dotted-line position, and the next arm 35 at the left is thrown out, and so on until all the tanks are filled or contain the required amount of ore.

In further explanation of my improved process I may state that the ore which I have treated is of a refractory nature and so volatile that heat above a certain degree carries the values off in the fumes. The gold seams incase in a covering or shell of a base metal or substance, which substance is dissolved and other impurities removed by the lime solution at a temperature of 90° approximately.

As regards the specific ore employed I have been unable to obtain a satisfactory analysis from different chemists to whom I have submitted it. One chemist called it a "combination of bismuth and zinc." Others have answered, "metal unknown." This is the best explanation I can give with reference to the treatment of a specific ore by my improved process.

Having thus described my invention, what I claim is—

1. The herein-described process for treating ore preparatory to leaching, consisting first in mixing the suitably-pulverized ore with lime; second, applying water to the mixture and introducing steam whereby the pulp is agitated and kept at a suitable temperature until certain impurities which retard leaching are freed; third, washing the pulp by the introduction of water and continued agitation; fourth, draining off the water as far as practicable, and finally drying the ore, substantially as described.

2. The herein-described ore-treating process, consisting in mixing suitably-pulverized ore with lime and supplying water to form a pulp of suitable consistency; agitating the pulp by the introduction of steam; washing the pulp by a further supply of water and continued agitation; drawing off the water; and finally drying the ore, substantially as described.

3. The herein-described process of treating ore preparatory to leaching, consisting in mixing the suitably-pulverized ore with lime, and supplying water to form a pulp of suitable consistency; agitating the pulp by the introduction of steam whereby it is maintained at a temperature of 90° Fahrenheit approximately; washing the ore by the introduction of water and further agitation by the introduction of air under pressure; draining the liquid from the ore and introducing air under increased pressure to facilitate the draining operation; and finally drying the ore, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

BELLA THOMAS NICHOLS.

Witnesses:

PERKINS B. BASS,

A. V. OLIVER.