

A. F. TANNER.
 CYANID PLANT.
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1,034,532.

Patented Aug. 6, 1912.

FIG. 1.

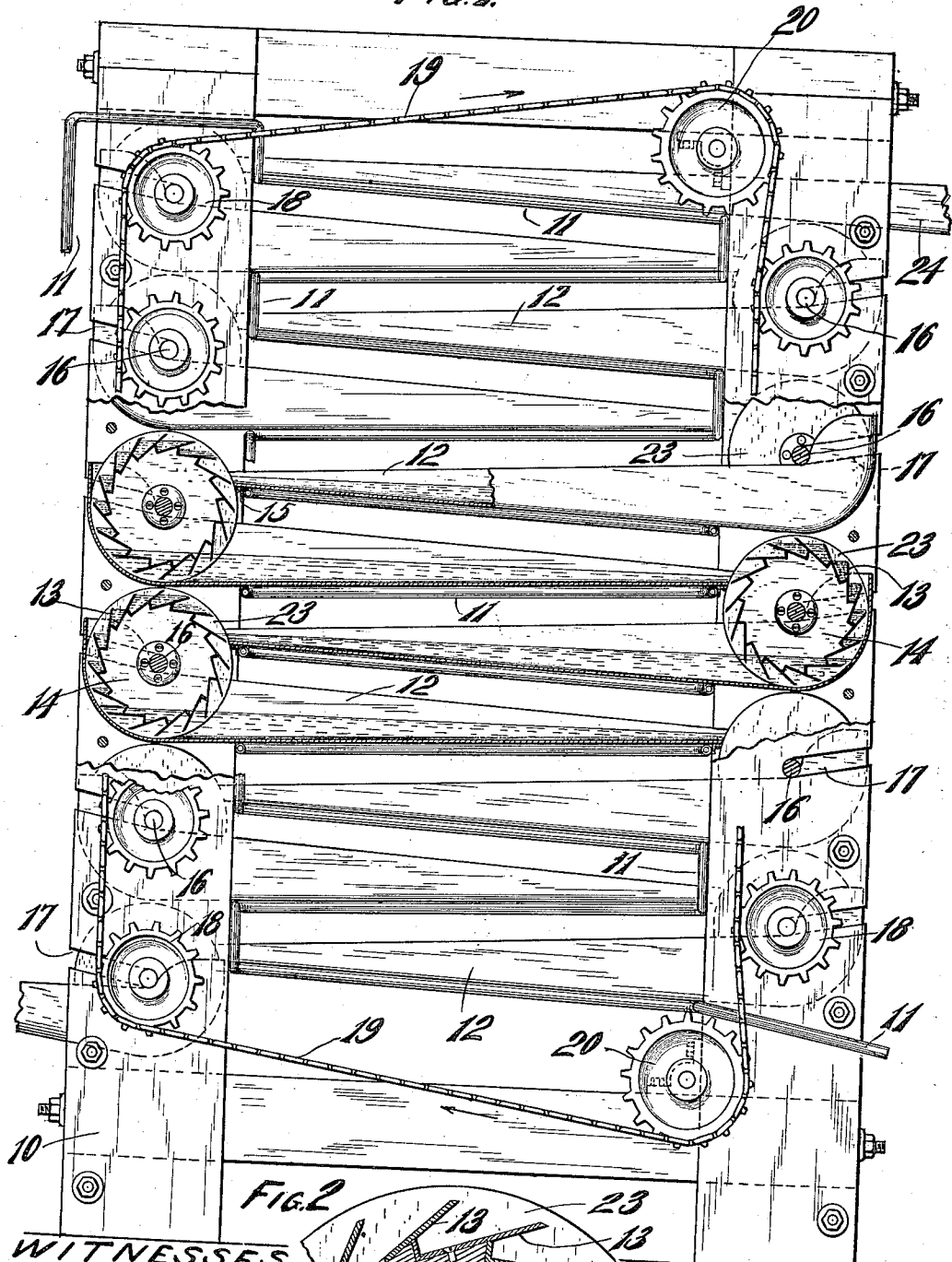
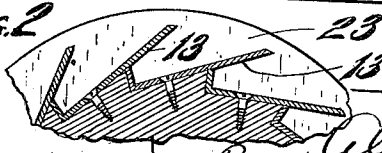


FIG. 2.



WITNESSES.

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CYANID PLANT.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALBERT F. TANNER, a citizen of the United States, and resident of the town of Greenfield, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Cyanid Plants, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention has for its object to provide a cyanid plant which will cause the ore pulp from stamp mills to be thoroughly subjected to the action of cyanid solution for the complete dissolution of the gold and silver contained therein by elevating it step by step by means of ribbed drums which agitate the pulp and discharge it at a higher elevation.

Heretofore cyanid processes have usually involved a continuous descent of the pulp with the cyanid solution, but with such systems the travel of the pulp to effect the dissolution of the values is necessarily of great length, requiring an expensive equipment as well as involving great expense in pumping the solution back to the starting point. With the best of such systems there is considerable value lost in the tailings because of the more rapid travel of the heavy ore particles down the inclined course.

With the present invention a better separation of values may be accomplished within a small space and without the necessity for the expensive installation and cost of pumping incident to the other systems.

Another object of the invention is to improve upon details of construction of a cyanid plant of this type.

With the above and other objects in view the invention consists in the cyanid plant as herein claimed and all equivalents.

Referring to the accompanying drawings in which like characters of reference indicate the same parts in the different views: Figure 1 is an elevation, partly in section, of a cyanid plant constructed in accordance with this invention; and, Fig. 2 is a detail view of a fragment of one of the ribbed agitating and elevating drums.

In these drawings 10 indicates a rectangular frame with its four corner uprights having secured thereto in any desirable manner a steam pipe 11 which extends horizontally across the frame at one end and then crosses

to the other end of the frame at an incline where it crosses the frame again horizontally and then rises and recrosses the frame at that same end and returns to the first mentioned end of the frame at an incline, and so on, with repeated crossings back and forth at both ends of the frame and gradually rising from the lower end of the frame to the upper end thereof. This steam pipe 11 constitutes a support for a series of inclined pans 12 which gradually deepen from one end to the other. At their deeper ends they are rounded to form concaves so as to lie close to the path of travel of plates 13 on ribbed drums 14 which are journaled across the frame. The pans 12 have their larger ends somewhat lower than their smaller ends, their inclination following the inclination of the pipe 11 between its horizontal portions on which the pan rests. At its smaller end the pan is provided with a downwardly extending flange 15 to engage the pipe 11 and thus hold the pan in place. The larger end of the pan has its rounding portion extending upwardly to a sufficient extent to follow the curvature of the drum 14 to a point higher than the shaft of the drum, the edges of the side walls of the pan forming a recess to engage the shaft of the drum. The drums 14 are mounted on shafts which are journaled in the frame by fitting in inclined slots 17 in the corner uprights thereof and are rotated by having sprocket wheels 18 on the ends of the shafts engaging a suitably driven chain 19 which travels around the outer side of the sprocket wheels on one side of the machine and is held against the inner side of the sprocket wheels on the other side of the machine by traveling around idle sprockets 20. Each drum is desirably made up of a number of toothed plates 21 on the shaft which have bent plates 13 secured to the teeth thereof, the outwardly bent inner edge of each plate engaging the next succeeding plate in the manner shown in Fig. 2. At the ends of the drums disk-shaped end plates 23 are preferably secured, which plates fit closely against the side walls of the inclined pans 12. The drums are rotated with the free ends of the plates in advance, traveling from the bottom of the pan up the rounded end so that they are assisted by the rounded ends of the pans in scooping up material from the bottom of the pans. As the plates continue in their

travel, they form pockets or buckets to lift the material and then on their downward movement they incline to discharge the material onto the smaller end of the pan 12 which is next above.

In operation, the pulp directly from the stamp mills, together with cyanid solution, are delivered to the lowermost pan 12 in any suitable manner and flow to the larger end thereof where they are carried up by the plates of the drum and discharged onto the upper end of the pan above. They flow down this pan into the range of the next drum and are thus carried together step by step to the upper end of the machine where they are discharged through a trough 24. Inasmuch as the plates 22 of the drum are of such a length that they clear the rounded ends or concaves of the pans, leaving a slight free space therebetween, it will be obvious that the heavier particles of pulp containing values will have a tendency to avoid the lifting action of the drum by escaping through this space between the plates and the rounded ends of the pans. Thus these particles which require longer treatment in order to be dissolved by the cyanid solution are delayed in their travel through the machine and are merely stirred or agitated by the turning of the drums so as to afford the cyanid solution a better opportunity for dissolving the values therefrom. The steam coil which supports the pans further serves to heat the pulp and thus assist the cyanid solution in the performance of its duties, while the action of the drums in elevating the pulp from one pan and dropping it onto the succeeding pan produces an aeration of the pulp which assists in the dissolution of the values.

It is obvious that the tower formed by the frame with its parts may be as tall as necessary to contain the number of pans which will accomplish the desired results in any particular case.

With this system and apparatus the path of travel of the pulp, as measured by the aggregate length of the pans is not to be compared with the path of travel of other cyanid plants where the pulp flows by gravity over a continuous decline, for in the latter cases the greater weight of the value bearing particles of pulp assists them in resisting the action of the cyanid solution by causing them to travel faster down the inclined trough, whereas in the present construction the greater weight of these particles serves the opposite effect of delaying their travel by causing them to escape the lifting action of the drum blades. Thus heavy particles will remain in the basin portion of a pan where they will be merely stirred and agitated by the movement of the blades until they are thoroughly scoured to free them from any refractory elements

which might protect them and are reduced by the action of the solution or are crowded by other similar particles into a position where they will be carried up by the blades and repeat their resisting action on reaching the next drum. Thus with a comparatively short path of travel it is possible to obtain a more thorough treatment of the ore by means of this invention. At the end of the system the solution is higher than at the beginning so that the heavy expense of pumping tons of solution to a great elevation as heretofore is entirely obviated.

The device is so constructed that pans may be quickly and easily removed when desired without the necessity for disconnecting any of the parts, it being only necessary to lift the upper end of a pan so as to disengage its flange 15 from the heating pipe, when the pan may be drawn out from the frame like a drawer. Furthermore, drums are independently removable by sliding them in the inclined slots 17 of the frame. The parts are thus quickly and easily interchanged so that when repairs become necessary they may be effected without materially interfering with the operation of the plant.

What I claim as new and desire to secure by Letters Patent is:

1. A cyanid plant, comprising a series of inclined pans each arranged above the preceding pan in the series with its higher end above the lower end of said preceding pan, and elevating means at the lower end of each pan for lifting material therefrom into the upper end of the succeeding pan in the series.

2. A cyanid plant, comprising a series of inclined pans arranged one above another with the lower end of each pan beneath the higher end of the succeeding pan, a ribbed drum rotatably mounted at the lower end of each pan and adapted to lift material therefrom to the upper end of the next pan of the series.

3. In a cyanid plant, a series of inclined pans arranged one above another with the lower end of each pan beneath the higher end of the succeeding pan in the series, the lower end of each pan forming a concave, a ribbed cylinder rotatably mounted at the lower end of each pan and having the concave coöperate therewith for lifting material to the upper end of the next pan in the series.

4. A cyanid plant, comprising a series of inclined pans with their lower ends curved to form concaves, a ribbed drum journaled across the lower end of each pan coöperating with the concave portion of the pan to lift material therefrom to the upper end of the succeeding pan.

5. A cyanid plant, comprising a frame, a heating pipe extending back and forth across the frame alternately at the opposite

ends thereof with its portions extending across the frame horizontal and its intermediate portions inclined, inclined pans removably resting upon the horizontal portions of the heating pipe, the lower end of one pan being beneath the higher end of the next pan in the series, drums journaled in the frame across the lower ends of the pans, and ribs on the drums for lifting material from the lower end of one pan to the upper end of the next pan.

6. A cyanid plant, comprising a frame, pan supports extending across the frame, inclined pans resting on the pan supports with the lower end of one pan beneath the upper end of the next pan in the series, said frame having inclined slots, and ribbed drums journaled in the inclined slots of the frame in the lower end of each of the pans to lift

material from the lower end of one pan to the upper end of the next pan of the series.

7. In a cyanid plant, a series of inclined pans arranged one above another with the lower end of each pan beneath the upper end of the next pan of the series, toothed drums journaled across the lower ends of the pans for lifting material therefrom to the upper ends of the succeeding pans, and flanged blades secured to the teeth of the drums to form projecting ribs, the flange of each blade engaging the next blade on the drum.

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

ALBERT F. TANNER.

Witnesses:

R. S. C. CALDWELL,
KATHERINE HOLT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."