

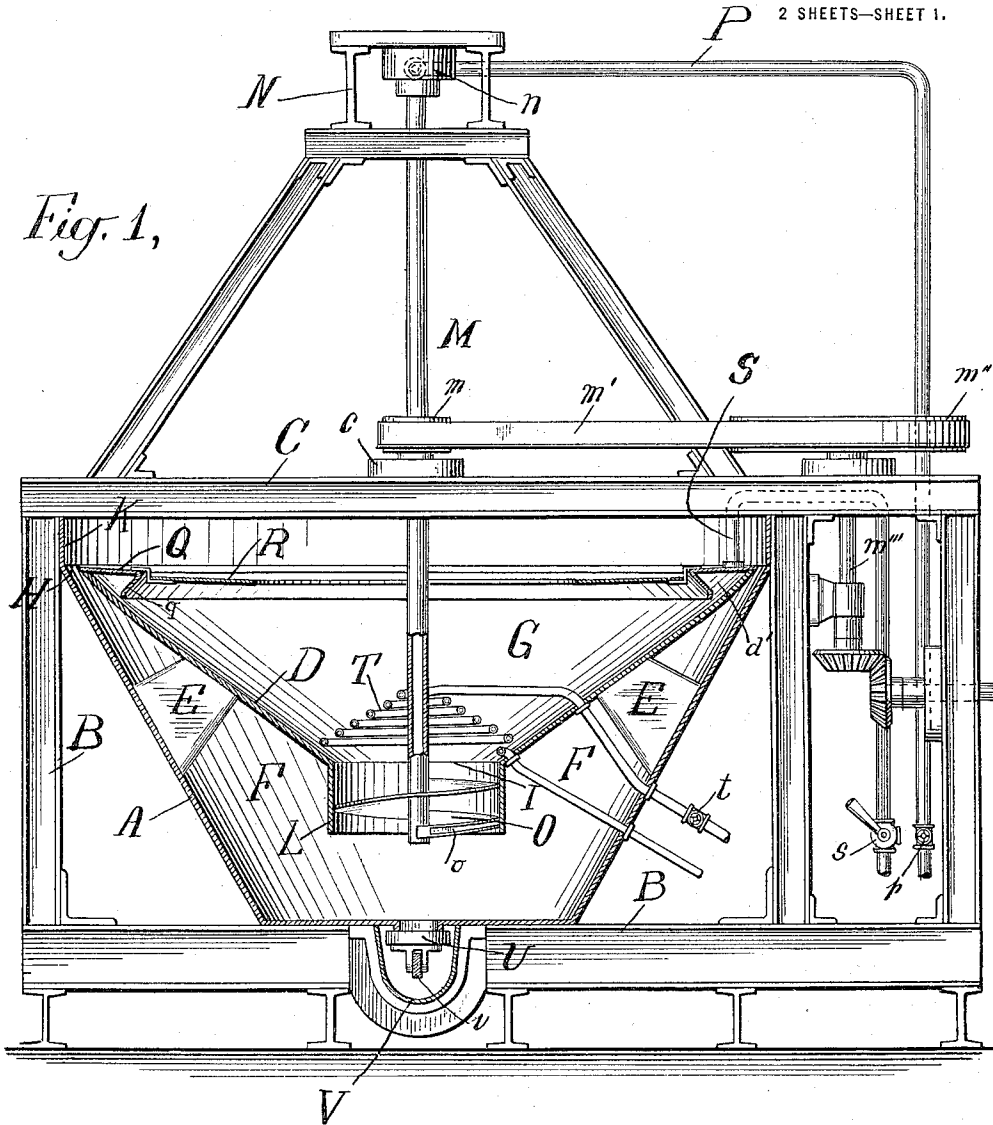
F. E. CARMAN.
CYANIDING APPARATUS.

APPLICATION FILED OCT. 22, 1912. RENEWED DEC. 22, 1914.

1,146,783.

Patented July 20, 1915.

2 SHEETS—SHEET 1.



WITNESSES
Marcus C. Hopkins
Frank A. Hammers

INVENTOR
Frederick E. Carman
BY Lemuel Davis & Goldsbrough
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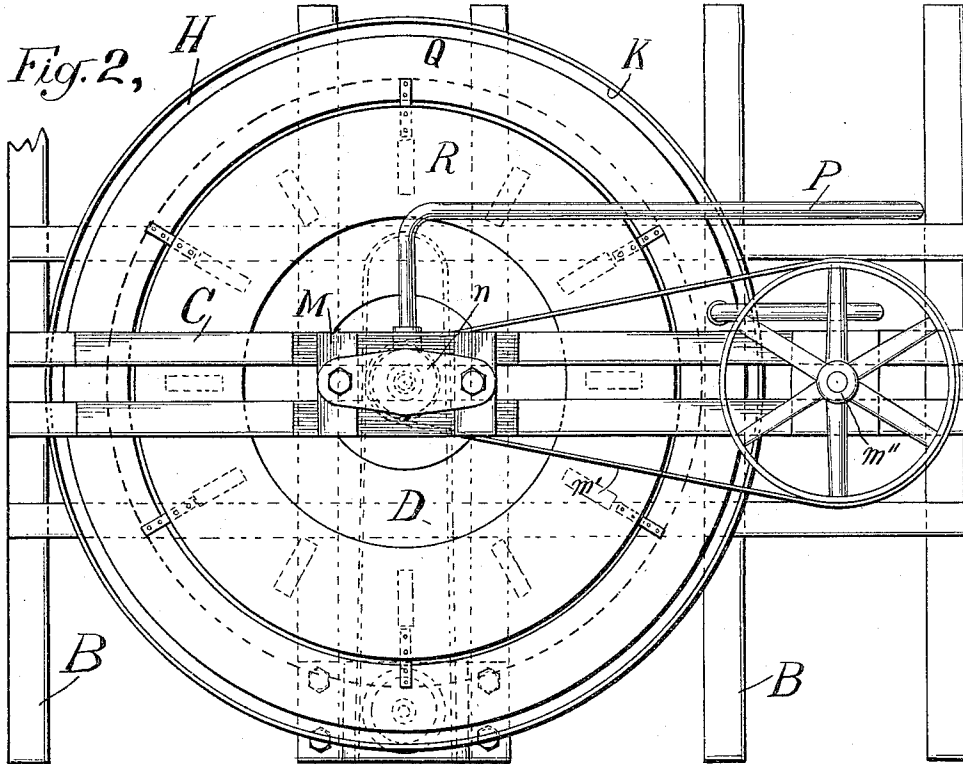
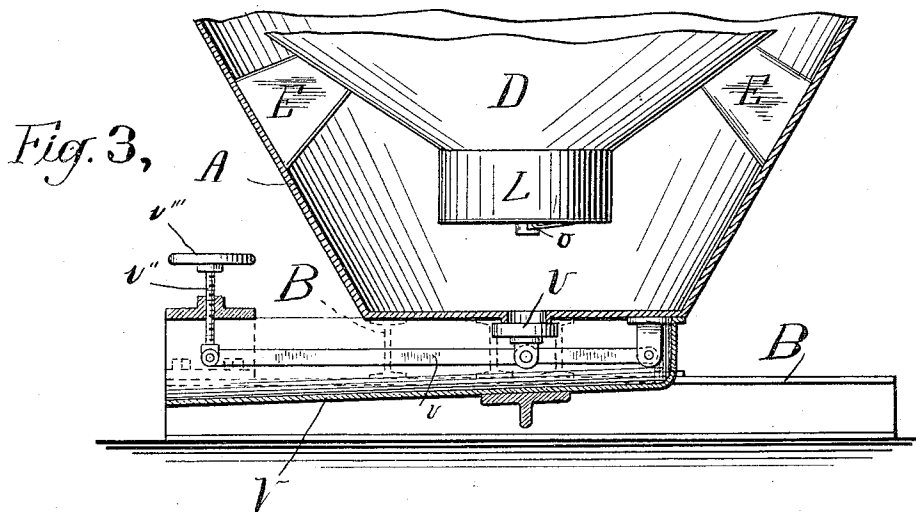
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UNITED STATES PATENT OFFICE.

FREDERICK E. CARMAN, OF JAMAICA, NEW YORK, ASSIGNOR TO MIRIAM E. CARMAN, OF BABYLON, NEW YORK.

CYANIDING APPARATUS.

1,146,783.

Specification of Letters Patent.

Patented July 20, 1915.

Application filed October 22, 1912, Serial No. 727,093. Renewed December 22, 1914. Serial No. 878,610.

To all whom it may concern:

Be it known that I, FREDERICK E. CARMAN, a citizen of the United States, residing at No. 99 Herriman avenue, Jamaica, Queens
5 county, State of New York, have invented certain new and useful Improvements in Cyaniding Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as
10 will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to tanks for the treatment of ores by the cyaniding process wherein the ore in the form of a pulp is
15 maintained in suspension within the cyaniding liquid and is brought into contact with the air in a thin film in order that it may be subjected to the oxidizing action of the air, and wherein the liquid is alternately heated
20 and cooled to produce the favorable results arising from this method of treatment.

The invention consists in an arrangement of the container by which the pulp is maintained in suspension and every part of the
25 tank charge is brought into contact with the air in a thin film through a system of circulation which requires the minimum lift of the material, and therefore the minimum expenditure of power.

30 The invention also resides in the various features of the organization and structure hereinafter particularly described and set forth in the appended claims.

35 An embodiment of the apparatus forming the subject matter of the invention is illustrated in the accompanying drawings, in which—

40 Figure 1 is a section in elevation through the center of the apparatus; Fig. 2, a plan; and Fig. 3 a detail in section of the lower portion of the container and the discharge valve mechanism.

In apparatus of this character it has been the usual practice, where a current circulation has been employed to maintain the pulp
45 in such a condition that the ore is kept in suspension, to create an upflow at the center of the tank which raises the central portion of the surface of the pulp and causes it to
50 flow outward by gravity and then downwardly at the outward portions of the tank.

I find that in order to maintain a given flow of liquid over the top of a circular partition within a tank that it is necessary, when
55 the flow is from within the partition out-

wardly that the difference in level which must be maintained between the liquid within the partition and that without is greater than when the flow is from without the partition toward the center. It appears that it
60 is easier to maintain the flow from the periphery toward the center, and I have utilized this phenomenon effectively in the illustrated embodiment of my invention.

Referring to the drawings; a tank A having the general form of an inverted frustum
65 of a cone is mounted upon and in a framework B, two members of which framework provide a bridge over the center of the tank. A partition D having the general form
70 of an inverted frustum of a flatter cone is mounted within the tank A and is supported by braces E, and this partition divides the interior of the tank A into an outer channel F, and an inner channel G which
75 communicate at the upper peripheral edge of the partition D, this edge of the partition being spaced at H from the wall of the tank A, and at the lower central part of the partition where a circular opening I is provided.
80 A cylindrical upward extension K is provided upon the upper edge of the tank A and a cylindrical downward extension L is provided upon the lower edge of the partition D surrounding the central opening I.
85 A hollow shaft M is mounted in a bearing *c* on the bridge C and a second bearing *n* on an upstanding frame N and the lower free end of this shaft extends downwardly in the axis of the tank and is provided upon
90 its lower end with a screw pump or propeller O which is designed to rotate within the cylindrical extension L of the partition D. A pulley *m* fast on the shaft M carries a belt *m'* driven from a second pulley *m''*
95 on a driving shaft *m'''* to which power is applied from any suitable source. While this arrangement for rotating the shaft M is a simple one, any suitable drive may be employed.
100 The upper bearing *n* for the shaft M is provided with a stuffing box and serves to conduct air or water from a pipe P to the interior of the hollow shaft M. The pipe P is provided with a valve *p* for the admission of fluid to the shaft M from suitable sources of air or water under pressure.
105 The screw pump O is provided with a duct *o* leading from the interior of the shaft M and issuing at the periphery of the blade at its lowermost point which rotates close to
110

the lower edge of the cylindrical extension L of the partition allowing air issuing from this duct to pass up both upon the inside and outside of the extension L. An apron Q
 5 extends inwardly at a slight downward slant from the upper edge of the partition D and its inner edge is provided with a lip *q* bent under and backward forming an annular chamber *d'* open only at its bottom. A second
 10 apron R is supported by brackets from the inner edge of the apron Q at a slightly lower level leaving a space through which liquid may run off the apron Q and follow the lip *q* and this second apron R extends
 15 inwardly at substantially the same downward slant as that which the apron Q is given. A pipe S issues into the chamber *d'* and is provided with a valve *s* for the admission and exhaust of air or water under
 20 pressure from a suitable source to flush or clean the chamber *d'* of any material which may accumulate within it. A heating coil T, preferably of the conical form shown, is supported on the partition D around the
 25 shaft M and over the circular opening I and is provided with a valve *t* for the control of a heating fluid such as steam from a boiler or other suitable source. A discharge opening in the bottom of the tank A is closed by
 30 a closure U from the outside and this closure is operated by a lever *u* which is drawn up or let down by a screw *u'* operated by a hand wheel *u''*. A trough V beneath the
 35 discharge opening conducts the discharged material from beneath the tank.

The operation of the apparatus is as follows: The container A is filled with pulp up to the level of the inner apron or thereabout and the driving mechanism is set in motion. The
 40 screw pump or propeller O creates a circulation of the pulp downwardly against the bottom of the container A effectually preventing settling upon the bottom and upwardly through the outer upflow channel,
 45 thence over the outer apron Q at the inner edge of which a portion of the liquid flows under and along the lip *q* creating a current which effectually prevents settling of the solid matter on the slanting wall of the partition D, and the remainder of the liquid
 50 flows over the inner apron R in a thin film on to the surface of the pulp contained in the downflow channel within the partition D. As the pulp flows outwardly in the outer
 55 upflow channel, its velocity is maintained by the narrowing of this channel as its diameter increases, by which maintenance of the velocity the settling out of the solids is prevented. As the pulp flows in a thin film
 60 over the aprons, it is thoroughly subjected to the oxidizing and cooling action of the air, and as it passes down the downflow channel, it is heated by coming in contact with the heating coils T.

65 It will be noted that the apparatus as con-

structed causes an alternate heating by contact with the air of every particle of the pulp as it is circulated. This is of great value in the process of cyaniding ores. During the circulation of the pulp, compressed
 70 air may be admitted to the pipe P by opening the valve *p*, and this air passing down the hollow shaft M and through the duct *o* in the propeller O issues just at the bottom edge of the partition D, although a portion
 75 of it finds its way upward through the downflow passage, and the greater part intermingles with the stream of pulp flowing upwardly in the upflow passage. This intermingling of the air with the current of pulp materially aids the action of the cyanid.
 80 The flow of air may be regulated and if desired water may be forced through the hollow shaft M. The flow of the heating agent, whether it be hot water or steam, through the heating coil may be regulated as desired.
 85 When the tank is to be emptied, the hand wheel *u''* may be turned to screw down the lever *u* and thus remove the closure from the orifice in the bottom of the container and allow the pulp to flow out through the
 90 trough V. The tank may be effectually cleansed by opening the valve *t* and allowing air, steam or water to flow into the annular chamber *d'* and thence down through the
 95 upflow channel to the discharge orifice.

What I claim is:

1. In a cyaniding tank, a receptacle having the form of an inverted frustum of a cone, a partition having the form of an inverted frustum of a flatter cone and secured within said receptacle to afford outer and inner compartments communicating at their upper peripheral portions and at their lower
 100 central portions, and means for creating a current of liquid downwardly within said inner compartment and upwardly within said outer compartment; substantially as described.

2. In a cyaniding tank, a receptacle having the form of an inverted frustum of a cone, a partition having the form of an inverted frustum of a flatter cone and secured within said receptacle to afford a circulating passageway which comprises an outer channel which flares upwardly from the bottom of the receptacle and issues through an annular narrow aperture into an inner channel which converges downwardly and issues into said outer channel adjacent to bottom
 110 of said receptacle, an apron extending inwardly from the upper annular aperture from said inner channel and inclined downwardly toward the center of the receptacle, and means for creating a circulation of a liquid contained within the receptacle downwardly through said inner channel and upwardly through said outer channel; substantially as described.

3. In a cyaniding tank, a container, a par- 130

5 tition in said container dividing the same
into an outer upflow channel and an inner
downflow channel, an apron extended in-
wardly from the upper annular mouth of
10 said upflow channel and inclined down-
wardly at a slight angle toward the center,
and means for creating a current of liquid
contained within said container upwardly
through said outer channel across said
15 apron and downwardly through said inner
channel against the bottom of the re-
ceptacle; substantially as described.

4. In a cyaniding tank, a container, a par-
15 tition within said container dividing the
same into an outer upflow channel and an
inner downflow channel, an apron extend-
ing inwardly and slightly downwardly from
the upper edge of said partition, a down-
wardly and backwardly extending lip upon
20 the inner edge of said apron, and means for
creating a current of liquid contained with-
in said container, upwardly through said
outer upflow channel across said apron and
downwardly through said inner downflow
25 channel against the bottom of the recep-

tacle; substantially as and for the purpose
set forth.

5. In a cyaniding tank, a container, a par-
tition within said container dividing the
same into an outer upflow channel and an
30 inner downflow channel, an apron extended
inwardly and slightly downwardly from
the discharge orifice of said upflow channel,
a downwardly and backwardly turned lip
upon the inner edge of said apron, a second
35 apron extending inwardly and slightly
downwardly from said first apron and
spaced from the inner edge thereof, and
propelling means for creating a current of
contained liquid upwardly through said up-
40 flow channel over said aprons and down-
wardly through said downflow channel;
substantially as described.

In testimony whereof I affix my signa-
ture, in presence of two witnesses.

FREDERICK E. CARMAN.

Witnesses:

M. A. BILL,

MARCUS C. HOPKINS.

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