UNITED STATES PATENT OFFICE.

JOHN M. CALLOW, OF SALT LAKE CITY, UTAH, ASSIGNOR TO METALS RECOVERY COMPANY, OF AUGUSTA, MAINE, A CORPORATION OF MAINE.

APPARATUS FOR CONCENTRATING ORES.

1,301,934.


Application filed March 4, 1916. Serial No. 82,185.

To all whom it may concern:

Be it known that I, JOHN M. CALLOW, a subject of the King of Great Britain, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Apparatus for Concentrating Ores, of which the following is a specification.

My invention relates to an apparatus for concentrating metallic ores by separating the metalliferous particles from the non-metalliferous or barren or rocky constituents thereof.

An important object of the present invention is the provision of novel means for relieving the tailings chamber of a flotation tank of much of the heavy or sandy portion of the rejected gangue while permitting the slimes and water to be discharged through a separate outlet.

With the above and other objects in view my invention consists of the parts and the constructions, arrangements and combinations of parts which I will hereinafter describe and claim.

In the accompanying drawings forming part of this specification the figure illustrates a longitudinal vertical sectional view of a pair of flotation tanks, embodying my invention.

The present invention is distinctly related to the art commonly known as buoyant processes and which is distinguished from the usual amalgamation processes in which the ore forms an amalgam, in that in the buoyant process a certain percentage of oil, or of two dissimilar oils or an oil and acid, or an oil and an alkali, or some other suitable substance, is mixed with finely ground ore pulp and the mixture is then subjected to aeration for the purpose of producing a froth composed of bubbles of air and oil to which the mineral particles attach, said froth having the appearance of an aggregation or mass of soap bubbles, which when collected and the froth discharged or broken down by natural settlement or by the addition of cold water, or other means, displaces the mineral particles that have been caught.

In the accompanying drawings embodying my aforesaid invention, 10, represents a tank of suitable material and which is hereby shown as of substantially rectangular form and comprising a bottom, 11, front and rear ends, 12, 13 and sides 14; the bottom in the present instance being shown inclined to facilitate the travel of the sandy constituent of the pulp to the tail end of the tank. Supported or sustained in any appropriate manner, is a false bottom, 15, of some suitable porous or pervious material, which should have the function of permitting the passage through it of a gaseous medium, but not the water or pulp.

Beneath the aforesaid permeable bottom of the tank is a chamber which may be discontinuous or may run continuously from one end of the tank to the other.

The permeable bottom may be inclined or otherwise arranged and for present purposes I show said bottom inclined to facilitate the movement thereover to a tailings chamber 20, of the coarse sands or rejected gangue. I also show the air chamber as discontinuous or made up of a series of separate chambers, each of which underlies a portion of the porous bed or bottom, and is supplied with air or a gaseous medium under pressure, which when admitted into a pulp containing water and finely ground ore and a frothable agent, will generate bubbles which rise through the pulp and serve as carriers for the metalliferous particles, said bubbles accumulating on the surface of the liquid constituent of the pulp and overflowing at or near the top of the tank into a suitable launder, 16.

At the head end of the tank there is disposed a partition, 17, the lower end of which terminates above the porous bottom, said partition forming between itself and the adjacent end of the tank, a chamber, 18, into which the pulp is delivered and permitted to escape under the partition and into the tank.

At the tail end of the tank there is a chamber, 20, into which the lower or discharge end of the porous bottom empties. Into this chamber the coarse sands or tailings too heavy to be elevated by the bubbles and which are gradually conveyed over the porous floor by inclining the floor, or by other instrumentalities, and are finally received into said chamber, which has a bottom discharge controlled by a valve, 21, which in the present instance has a stem, 22, extending upwardly to the top of the tank and provided with a hand-wheel, 23, or other agency by which the valve may be raised from its seat to uncover the discharge opening and
allow a part or all of the accumulated tailings to be delivered from the aforesaid chamber. This valve really serves, in the present instance, as a so-called "bleeder" for the sandy portions of the pulp and is intended to effect a sort of classification of the tailings by removing the heavy sandy constituents thereof from the slimes and water, which latter are discharged through a pipe, 24, which connects with the chamber, 20, at a point above the bottom of the latter and extends upwardly to a suitable height and is adapted to control the level of the liquid in the tank, in a manner well known in this art.

The slimes and water discharged from the pipe, 24, may be sent to the head end of a second or cleaner tank, 25, similar to the tank first described, or said slimes and water may be sent for admixture with the sandy portion of the tailings which have been removed from the tailings chamber by opening the valve, 21, and which combined material may be sent to a regrinding machine or to a reconcentrating device or can be otherwise treated for the recovery of any remaining valuable mineral particles.

The apparatus, substantially as described is simple in construction and provides for such a classification of the tailings that much of the coarse sands found in the tailings is separated from the slimes and water before the latter enters the discharge or overflow pipe and hence the latter will not become clogged by the heavy sands seeking an outlet through the same.

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

1. The combination with a plurality of porous bottom, gaseous-bubble separatory tanks, the initial tank having a tailings chamber with a normally slightly open outlet for coarse sands, of a connection between said tanks having one end communicating with said tailings chamber above but proximate to the tailings outlet and having the other end leading into the head end of another tank, said connection having such capacity and discharging in such proximity to the pulp level in the initial tank as to maintain a classifying current in the tailings chamber.

2. The combination with a plurality of porous bottom, gaseous-bubble separatory tanks, the initial tank having a tailings chamber with a normally slightly open outlet for coarse sands, of a connection between said tanks having one end communicating with said tailings chamber above but proximate to the tailings outlet and having the other end leading into the head end of another tank, said connection having such capacity and discharging in such proximity to the pulp level in the initial tank as to maintain a classifying current in the tailings chamber, and said connection being adjustable to vary the liquid level in the initial tank.

3. A separatory cell, having a porous bottom and means for admitting a gaseous medium therethrough, said tank having a depressed tailings chamber at the terminus of said bottom, the bottom of said chamber having a normally slightly open valve-controlled outlet for coarse sands, and a pipe connection exterior to the tail end of the tank having one end entering the tailings chamber slightly above the tailings outlet and in such proximity to the pulp level in said chamber as to maintain a classifying current therein.