

July 28, 1925.

W. F. ALLEN, JR., ET AL

1,547,548

FLOTATION CELL

Filed Feb. 21, 1921

2 Sheets-Sheet 1

Fig. 1.

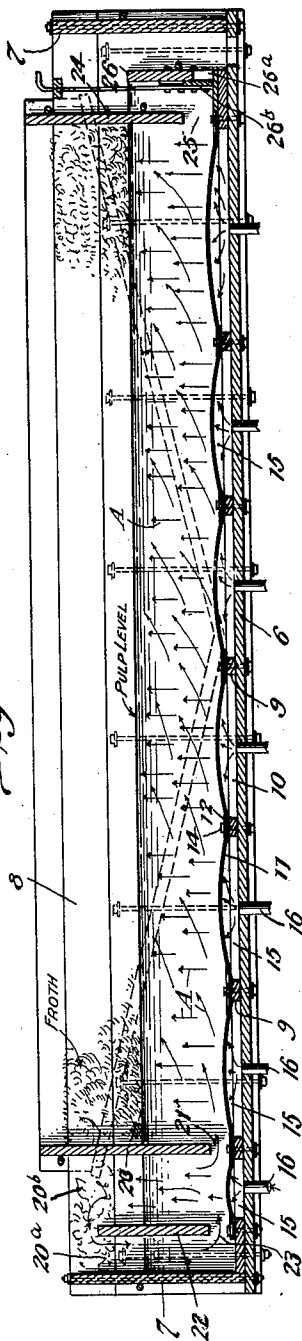


Fig. 2.

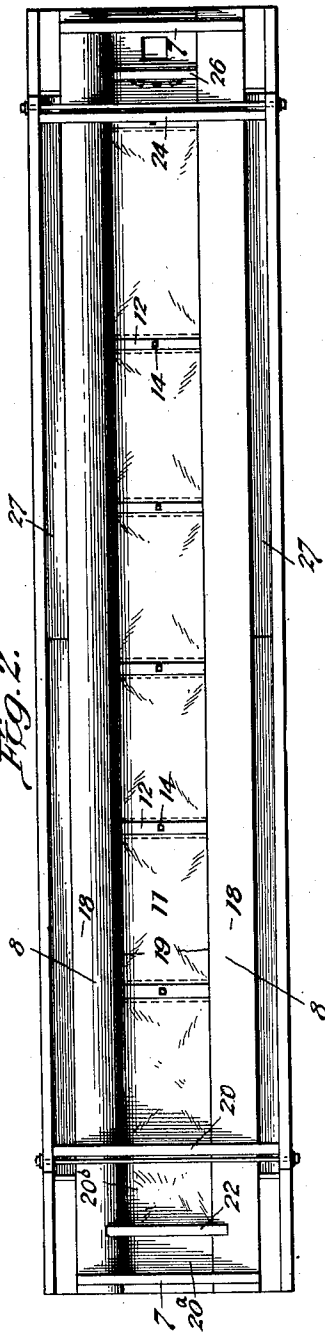
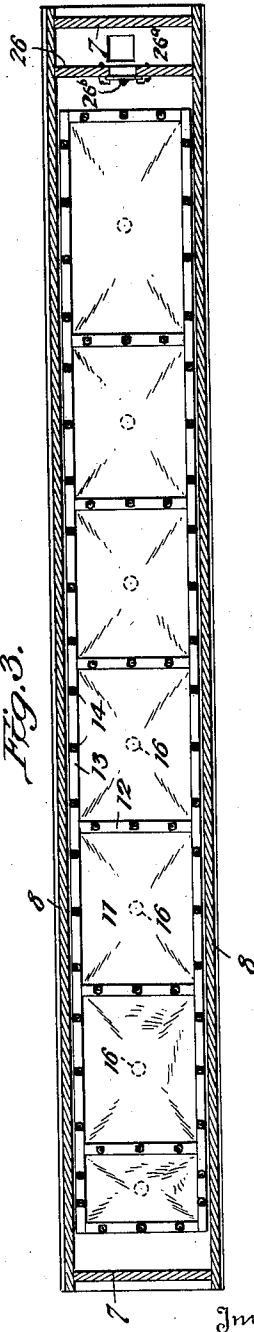


Fig. 3.



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2 Sheets-Sheet 2

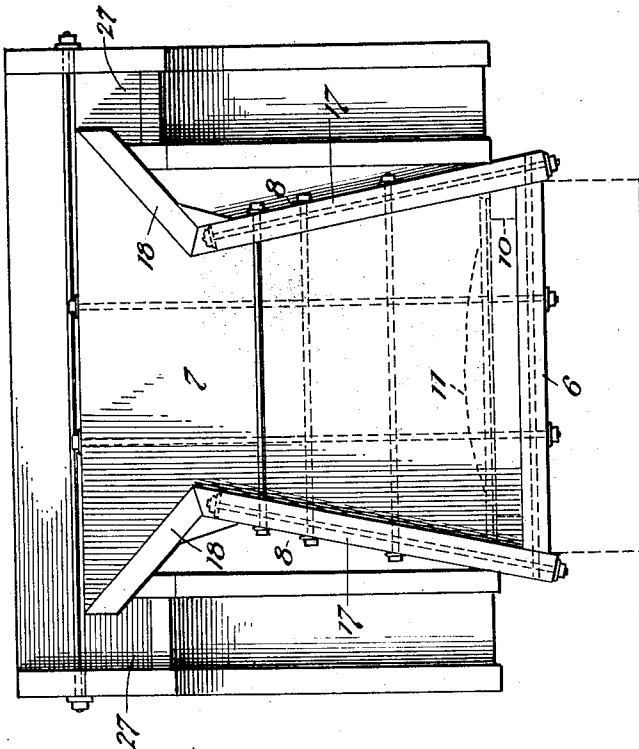


Fig. 5.

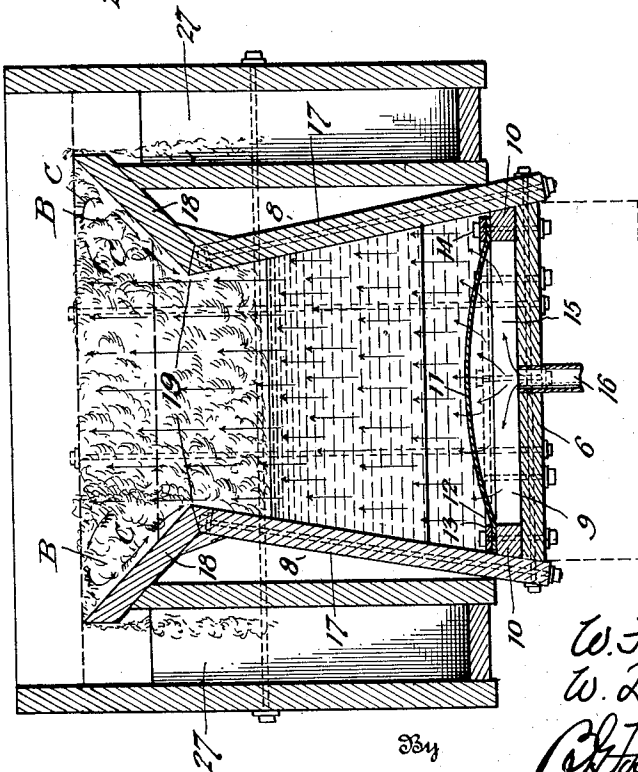


Fig. 4.

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UNITED STATES PATENT OFFICE.

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FLotation CELL.

Application filed February 21, 1921. Serial No. 446,673.

To all whom it may concern:

Be it known that we, WILBUR F. ALLEN, Jr. and WALTER L. REID, citizens of the United States, residing at Telluride, in the county of San Miguel and State of Colorado, have invented certain new and useful Improvements in Flotation Cells, of which the following is a specification.

The present invention relates to the art of separation by flotation, and the primary object is to provide an apparatus for carrying the same into effect, whereby high grade mineral froth is obtained substantially free from the lower grades, thereby securing more pure concentrates and a consequent increase in the extraction values.

In the accompanying drawings:—

Figure 1 is a longitudinal sectional view through a flotation cell of the improved character,

Figure 2 is a plan view of the same,

Figure 3 is a horizontal sectional view.

Figure 4 is a vertical cross sectional view on an enlarged scale,

Figure 5 is an end elevation.

In the structure disclosed, the cell is in the form of an elongated tank body having a bottom 6, end walls 7, and side walls designated generally by the reference numeral 8. The bottom 6 has transverse bars 9 and longitudinal bars 10 thereon, and stretched over said bars is a foraminous sheet 11 that may be held in place by metal cleats 12 and 13 located on said bars 9 and 10, and secured thereto by suitable fasteners, as bolts 14. It will thus be seen that a series of pockets 15 is formed in the lower portion of the cell, and communicating with each of these pockets is a supply pipe 16 by which air or other gaseous fluid may be conducted thereto.

The side walls 8, as shown more particularly in Figures 4 and 5 have upwardly and inwardly inclined lower portions 17 and upper portions 18 that incline upwardly and outwardly. As a result a contracted throat 19 is formed at the juncture of said portions 17 and 18, while the top of the cell flares outwardly. One end of the tank or cell is provided with an intake in the form of an agitating and emulsifying compartment. This compartment is defined by the side walls, an end wall 7 and a transverse partition wall 20 that terminates short of the bottom of the cell to provide an inlet port 21. A vertical transverse baffle 22 is located in the compartment, preferably nearer the end wall 7

than the partition 20. The baffle also terminates short of the bottom, providing a port 23 that affords communication between the two chambers 20^a and 20^b. It will be noted that the walls of the intake compartment extend above the baffle 22, and that one of the air cells 15 is beneath the compartment 20^b only.

A transverse partition wall 24 is located in the opposite or outlet end portion of the cell, and also terminates short of the bottom, forming an outlet port 25. Between said partition 24 and the adjacent end wall 7 is another transverse wall 26 that extends above the port 25, but terminates short of the juncture of the portions 17 and 18 of the side walls. This wall 26 has a lower "sand" outlet 26^a that may be more or less closed by a vertically sliding gate 26^b. Located alongside the cell are receiving troughs 27 that are overlapped by the upper margins of the portions 18 of the side walls 8, as clearly illustrated in Figure 4.

Briefly outlined, the operation is as follows:

The pulp is delivered into the chamber 20^a of the cell, and its level throughout the apparatus, determined by the wall 26, will be below the throat 19, as shown in Figures 1 and 4. Air under pressure is delivered into the various compartments 15 and will be distributed so as to flow through the foraminous wall 11, which is preferably of canvas or other fabric. The air bubbling up through the chamber 20^b causes an upward agitation of the material, forming an oily froth which circulates over the baffle 22 as indicated by the arrow until it becomes emulsified and passes under the partition into the main receiving compartment. In this latter compartment the air bubbles, leaving the air mat, travel upwardly, as indicated by the vertical arrows A, and are brought together at the throat 19. Consequently these air bubbles increase their speed as they pass upwardly through the pulp. A froth bed is of course formed upon the surface of the pulp, and the currents of air keep their course vertically through this froth bed to the surface thereof, but the action is to crowd the froth bubbles continuously into the undisturbed regions B on opposite sides of the upflowing air currents and above the outstanding portions 18 of the side walls. Here the froth breaks up or concentrates, the surface portion thereof

overflowing into the troughs 27. These undisturbed portions or regions, however, permit the gangue and mineral of low grade to gravitate down the wall portions 18, as indicated by the arrow C and return into the agitated body of froth. It will thus be seen that the high grade froth is being constantly collected, while the lower grades are re-treated until thoroughly freed from the gangue and in such a condition that they will remain on the froth surface in the form of high grade mineral froth. Therefore the process of and apparatus for keeping the sulphide in suspension that has the least tendency to float and not recovering it until it is thoroughly oiled, and will stay on the surface without the aid of the air current directly beneath the same, results in exceptionally pure concentrates with greater value in extraction.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is:—

1. In apparatus of the character set forth, the combination with a cell having side walls, the lower portions of which are disposed in upwardly convergent relation and upper portions in upwardly divergent relation, forming a contracted throat at the juncture of said portions, means for maintaining the pulp level below the throat, and means for causing an upward flow of a gaseous fluid through the cell.

2. In apparatus of the character set forth, the combination with a cell having opposite side walls, the lower portions of both of which incline inwardly and upwardly, the upper portions of said side walls inclining outwardly and upwardly, forming a contracted throat at the juncture of said portions, means for maintaining the pulp level below the throat, means for causing an upward flow of a gaseous fluid through the cell, and means for collecting the froth that overflows the upper edges of the said side walls.

3. In apparatus of the character set forth, the combination with an elongated tank having side walls, the lower portions of which incline upwardly and inwardly, the upper portions inclining upwardly and outwardly, forming an intermediate throat and an expanded mouth, means for introducing pulp into the tank at one end, means permitting the outflow of the residues from the other end and maintaining the level in the tank below said throat, means for introducing air into the bottom of the tank and distributing it over the area thereof, and side troughs for collecting the froth that overflows the side walls of the said mouth.

4. In apparatus of the character set forth, the combination with a cell, of froth creating means therein, and feeding means for the cell, comprising a compartment, a wall separating the compartment from the cell and having an exit beneath it into the cell, a baffle extending across the compartment in spaced relation to said wall and terminating short of the bottom and top of the compartment to permit circulation both beneath and above it, means for feeding material into the compartment on one side of the baffle, and means for delivering an agitating medium into the compartment on the other side of the baffle.

5. In apparatus of the character set forth, the combination with a cell, of froth creating means therein, and feeding means for the cell, comprising a compartment, a wall separating the compartment from the cell, a baffle extending completely across the compartment in spaced relation to the wall and terminating short of the bottom and top thereof to permit circulation both beneath and above it, an outlet from the lower portion of the compartment into the cell at the rear side of the baffle, means for feeding material into the compartment at the front side of the baffle, and means for delivering an upwardly flowing supply of agitating fluid into the rear portion of the compartment between the baffle and said outlet.

In testimony whereof we affix our signatures in the presence of two witnesses.

WILBUR F. ALLEN, JR.
WALTER L. REID.

Witnesses:

C. P. ADAMS,
W. F. ALLEN, Sr.