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FLOTATION APPARATUS

John C. MacIntosh, Douglas, Ariz., assignor to Phelps Dodge Corporation, New York, N. Y., a corporation of New York

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9 Claims. (Cl. 209—168)

This invention relates to the concentrating of mineral values from ores or other substances by the so-called flotation process, wherein a pulp containing said ores or other substances, together with flotation re-agents, is subjected to aeration and agitation to produce a value-containing froth, thereby separating said values from the barren or rocky materials, known as gangue. An object of the invention is the provision of a novel flotation apparatus whereby improved separation of the mineral values from gangue is attained, and high grade concentrates are produced with marked efficiency. Another object is to provide an apparatus whereby the roughing and cleaning of the concentrate are accomplished in one unit, as distinguished from prior practice wherein only rough concentrates are produced in one unit and are then transferred to a separate apparatus for cleaning. In attaining these objects the invention provides a new and improved control over the introduction of air into the pulp as a result of which the air is distributed throughout the pulp with particular thoroughness and effectiveness; and a novel arrangement of baffles contributing to the production of clean tailings and high grade concentrates. The apparatus provided by the invention is furthermore simple in construction, requires little power for its operation, and is inexpensive in upkeep. Further features and advantages of the invention will be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a view in side elevation of an apparatus constructed in accordance with the invention.

Fig. 2 is a view partly in plan and partly in horizontal section, taken on line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional detail view, on an enlarged scale, taken on line 3—3 of Fig. 2.

Fig. 4 is a vertical sectional view, on an enlarged scale, taken on line 4—4 of Fig. 2.

Fig. 5 is a vertical sectional view, on an enlarged scale, taken on line 5—5 of Fig. 1.

Fig. 6 is a detail view, partly in plan and partly in horizontal section, showing the agitator and taken on line 6—6 of Figure 5.

Fig. 7 is a bottom plan view of the agitator.

Fig. 8 is an enlarged sectional detail view of the agitator, taken on line 8—8 of Fig. 6.

Fig. 9 is a view, partly in vertical section and partly in elevation illustrating an alternative means for introducing air to the shaft of the rotor or agitator.

Referring to the drawings, there is shown an enclosing cell or chamber comprising a bottom 1, end walls 2, 3 and side walls 4, 5. The pulp is introduced into the cell, from a suitable conduit 6, through an opening 7 (Fig. 3) in the wall 2. The tailing discharges through an opening 8 in the end wall 3 into a vertical passageway 9, thence over an adjustable weir 10 of known type, into a passage 11, and then out through discharge conduit 12. By adjustment of the weir 10 in the usual way the pulp level may be regulated as desired.

Extending across the cell between end walls 2 and 3, are a plurality of baffle plates which divide the cell into compartments. Two of these plates, designated 13 and 14 respectively, converge downwardly as shown in Figure 5. Above said plates 13, 14 are upwardly converging baffles 15, 16, respectively, each of which may, as shown, comprise a plurality of plates, 15', 15'', and 16', 16'' respectively. One or more of the various baffle plates may be perforated, as indicated at 17.

The baffles may be supported in the cell in any suitable manner. For example, the ends of the plate 13, may engage in grooves 18 in the respective end walls 2, 3, while similarly the ends of plate 14 may engage in grooves 19 in said walls. Said grooves extend to the tops of said walls, to enable said plates to be conveniently inserted. The baffle plates 15 likewise may engage at their ends in grooves 20, and the plates of baffle 16 in grooves 21.

A hollow shaft 22 is journaled in suitable bearings, such as 23, 24, on cross bars 25, 26, which in turn are supported by standards 27, 28 at opposite ends of the cell. Said shaft is adapted to be rotated from a suitable power source in any convenient manner, as by pulley 29, shaft 30, and bevel gears 31, 32. The upper end of shaft 22 extends into stuffing box 33, and receives air under pressure from pipe 34. A valve 35 in said pipe may be operated to regulate the supply of air to said shaft.

At its lower end the hollow shaft 22 carries a rotor, or agitator 36 comprising a hollow cylindrical body 37 having a bottom 38 of porous material such as perforated rubber, canvas, woven wire cloth, or the like. Wings 39, extending radially from the periphery of the rotor body 37, may be provided, if desired, to assist in the agitating of the pulp. Scraper blades 40 are shown secured to the rotor below the porous element 38.

In operation, the pulp is fed into the cell through the channel 6 and opening 7, the pulp level being determined by the height of the weir 10 over which the tailings pass into the discharge channel 12. The rotor or agitator 36 is