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FLOTATION CELL

Filed June 9, 1930

Fig. 1.

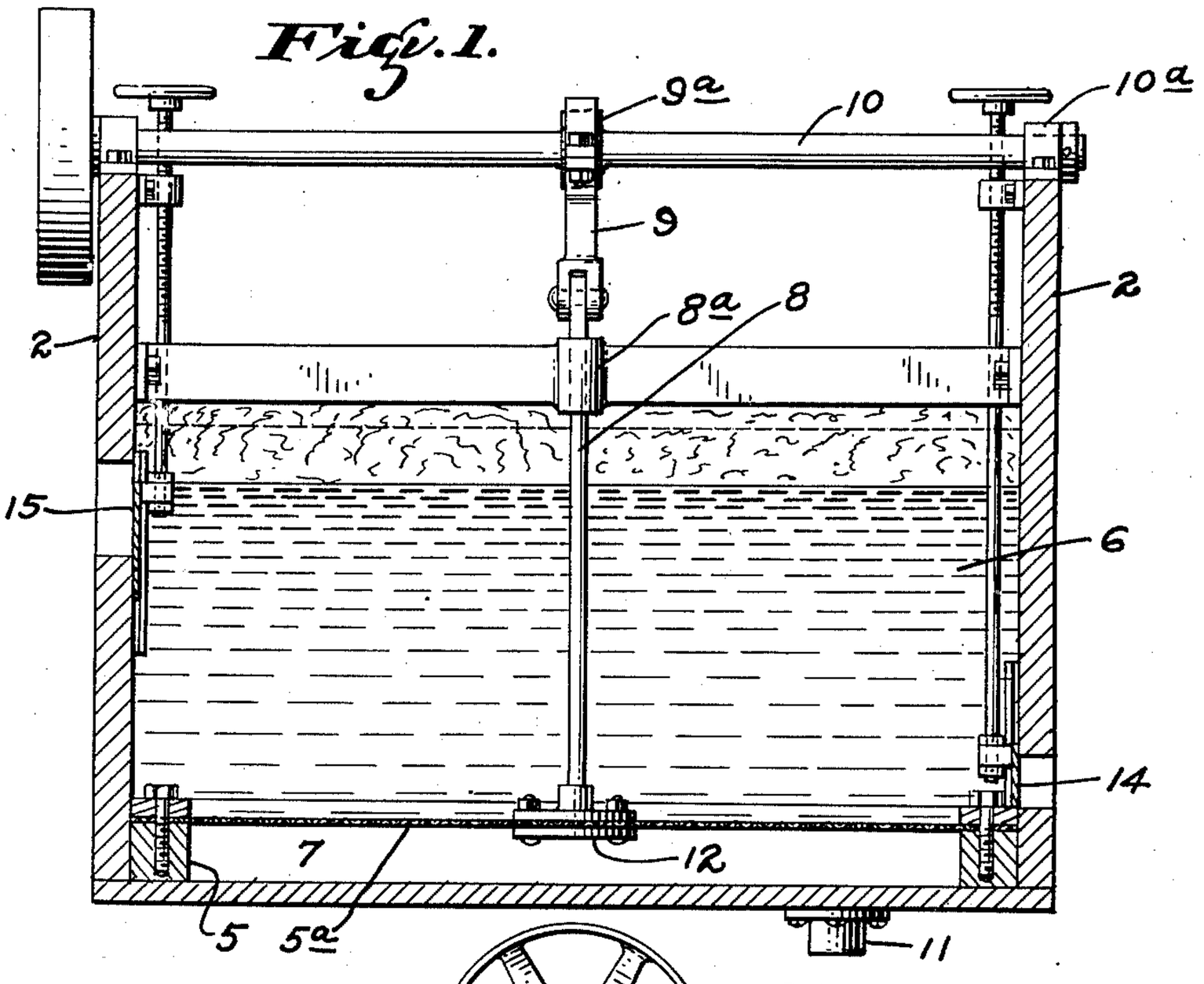
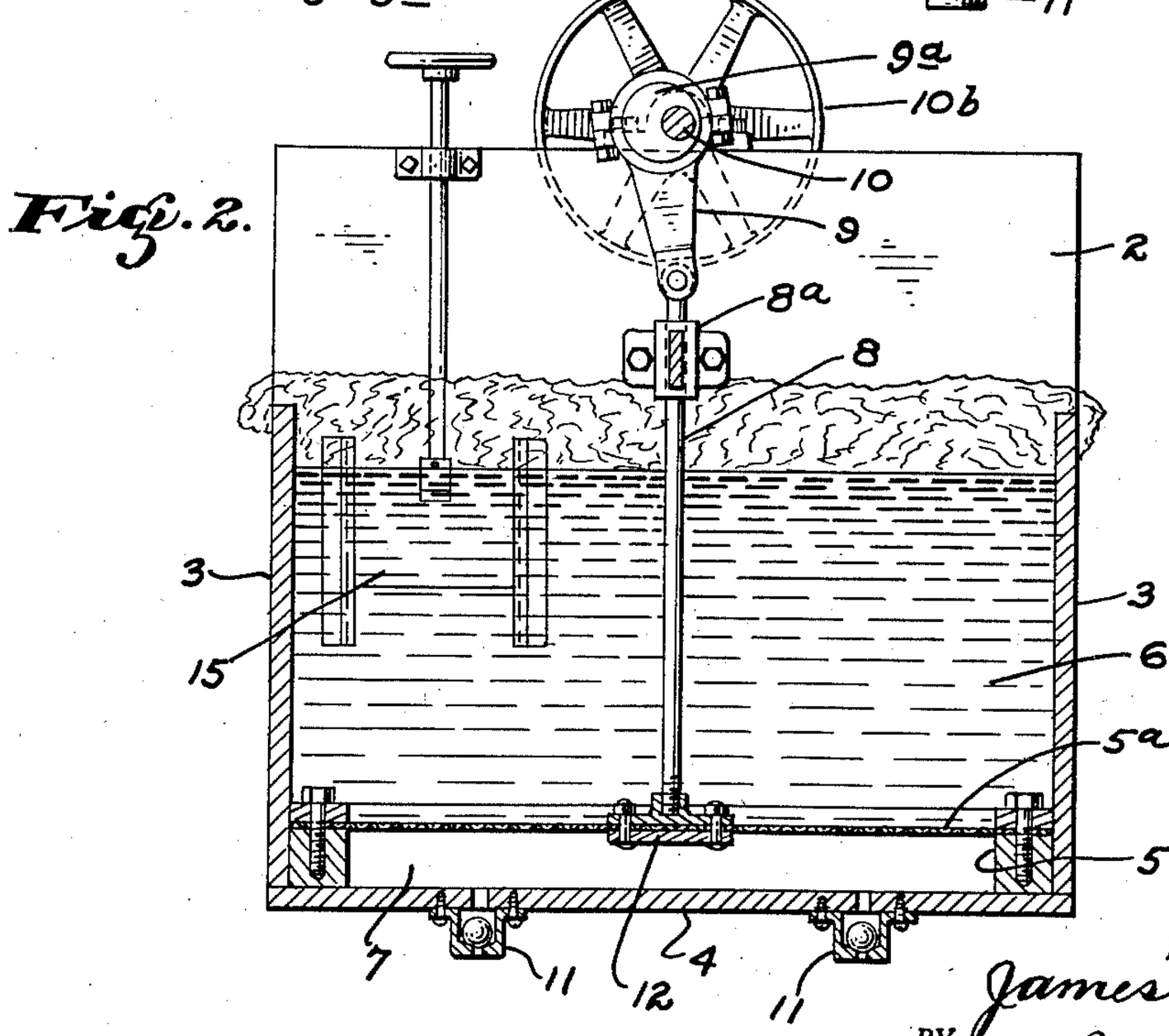


Fig. 2.



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UNITED STATES PATENT OFFICE

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FLOTATION CELL

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This invention relates to a flotation apparatus designed for the concentration of metallic ores by separating the metallic particles from the barren or rocky constituents thereof, and especially to means for agitating the diluted pulp and ore particles and for forcing air therethrough.

The object of the present invention is to provide a simple, positive device for supplying air and agitation to a diluted ore pulp for the purpose of making a froth for the collection of metallic particles of ores and minerals and to effect their concentration and separation from the non-metallic gangue.

The flotation apparatus is shown by way of illustration in the accompanying drawing, in which—

Fig. 1 is a longitudinal vertical section of the apparatus, and

Fig. 2 is a cross section of the same.

Referring to the drawing in detail and particularly Fig. 1, it will be noted that the flotation cell or apparatus consists of a rectangular shaped box having side members 2, end sections 3, and a bottom section 4. Disposed adjacent the bottom of the machine and secured all around its peripheral edge on a ledge 5 is a sheet of fairly heavy canvas such as shown at 5*a*, this canvas being sufficiently porous to permit air and liquid to pass therethrough. This canvas divides the cell into a pulp compartment 6 and an air compartment 7.

A vibratory or up and down movement is transmitted to the canvas when the apparatus is in operation and this is accomplished as follows:

8 indicates a rod which is guided in a bearing 8*a*. The upper end of the rod is pivotally secured to an eccentric strap 9 which is actuated by an eccentric 9*a* secured on a shaft 10. This shaft extends crosswise of the cell and is journalled in bearing members 10*a*, the shaft being continuously driven in any suitable manner or as here shown by a pulley 10*b*. The bottom portion 4 of the cell is provided with check valves 11 of suitable construction through which air is admitted.

Ore pulp properly diluted and treated with collecting and frothing reagents is delivered to the cell and if power is transmitted to shaft 10, a rotary motion will be transmitted to impart a reciprocal movement to the rod 8 and to the canvas 5*a* which is secured to the rod as indicated at 12. The up and down movement of the canvas causes alternate suction and compression strokes in chamber 7. During upward movement check valves 11 lift and admit air to chamber 7 and during downward movement of the canvas air is forced through the canvas and upwardly through the pulp. Also the reciprocal or up and down movement of the canvas causes agitation of the pulp and the content of the cell. The ore pulp, properly treated with collecting and frothing reagents, etc., is continuously introduced into the cell through an inlet launder, not here shown. Air is drawn into compartment 7 through the check valves 11 when the apparatus is in operation and is forced through the canvas or diaphragm into the ore pulp in the cell creating a froth which collects the mineral particles and discharges them into a concentrate launder at one end of the machine and above the water level. The gangue material settles towards the bottom and is discharged through a gate 14 while the water level is maintained by means of the gate 15, the gates 14 and 15 being of standard construction.

A flotation concentrating device constructed as here shown has a number of advantages:

(*a*) The introduction of air through the entire area of the canvas by the method described creates a uniform finely textured froth which is highly efficient for the purpose intended;

(*b*) The reciprocal motion of the canvas diaphragm keeps it cleaned and prevents channeling of the pulp and the introduction of an excessive amount of air along the channel openings;

(*c*) The reciprocating, or up and down, movement of the canvas also imparts a gentle surging agitation to the pulp mass and provides a mechanical aid in the separation of

the barren gangue from the valuable metal contents of the ores;

(*d*) As the machine effects a positive uniform introduction of air into the pulp mass by the motion of the canvas diaphragm, the necessity for an auxiliary air compressing plant, such as required by most flotation apparatus is entirely obviated.

(*e*) Summarizing the above advantages, it may be stated that a substantial and important improvement is effected in the mechanical method of air introduction through a self cleaning, oscillating diaphragm, which effects a uniform air distribution to all parts of the frothing cell, while at the same time a more desirable form of agitation is imparted to the mass of ore pulp and thus aids in effecting a concentration of the valuable elements of the ore and the separation of the products resulting from the operation of the device.

While certain features of the present invention are more or less specifically described, I wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finishes of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a flotation cell of the character described, a tank provided with a porous flexible diaphragm whereby the tank is divided into a pulp receiving compartment and an air compartment, and a reciprocal member connected with the diaphragm whereby an up and down movement is transmitted to the diaphragm to alternately introduce and compress air in the air compartment and to force the air through the diaphragm and the pulp and to agitate the pulp.

2. An air flotation cell comprising a tank, a porous flexible diaphragm disposed adjacent the bottom of the tank and dividing the tank into a pulp receiving compartment and an air compartment, and means for transmitting an up and down movement to the diaphragm whereby air is drawn into the air compartment during upward movement of the diaphragm and compressed and forced through the diaphragm and the pulp during downward movement of the diaphragm.

3. An air flotation cell comprising a tank, a porous flexible diaphragm disposed adjacent the bottom of the tank and dividing the tank into a pulp receiving compartment and an air compartment, air inlet check valves connected with the air compartment, and means for imparting a reciprocal movement to the diaphragm whereby air is intermittently admitted to the air compartment through the check valves to be compressed and forced through the diaphragm and the pulp body disposed above the diaphragm.

4. An air flotation cell comprising a tank, a porous flexible diaphragm disposed adjacent the bottom of the tank and dividing the tank into a pulp receiving compartment and an air compartment, air inlet check valves connected with the air compartment, a drive shaft, an eccentric mounted thereon, and a rod forming a connection between the eccentric and the diaphragm whereby an up and down movement is transmitted to the diaphragm to agitate pulp thereon and force air therethrough.

5. An air flotation cell comprising a tank, a porous flexible diaphragm disposed adjacent the bottom of the tank and dividing the tank into a pulp receiving compartment and an air compartment, a drive shaft, an eccentric mounted thereon, and a rod carried by the eccentric and directly connected with the flexible diaphragm to vibrate the same.

6. In a flotation cell of the character described a tank provided with a porous flexible diaphragm whereby the tank is divided into a pulp receiving compartment and an air compartment and a reciprocal member connected with the diaphragm, whereby an up and down movement is transmitted to the diaphragm to alternately increase and decrease the compression of the air in the air compartment thereby forcing air through the diaphragm, and to agitate the pulp.

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