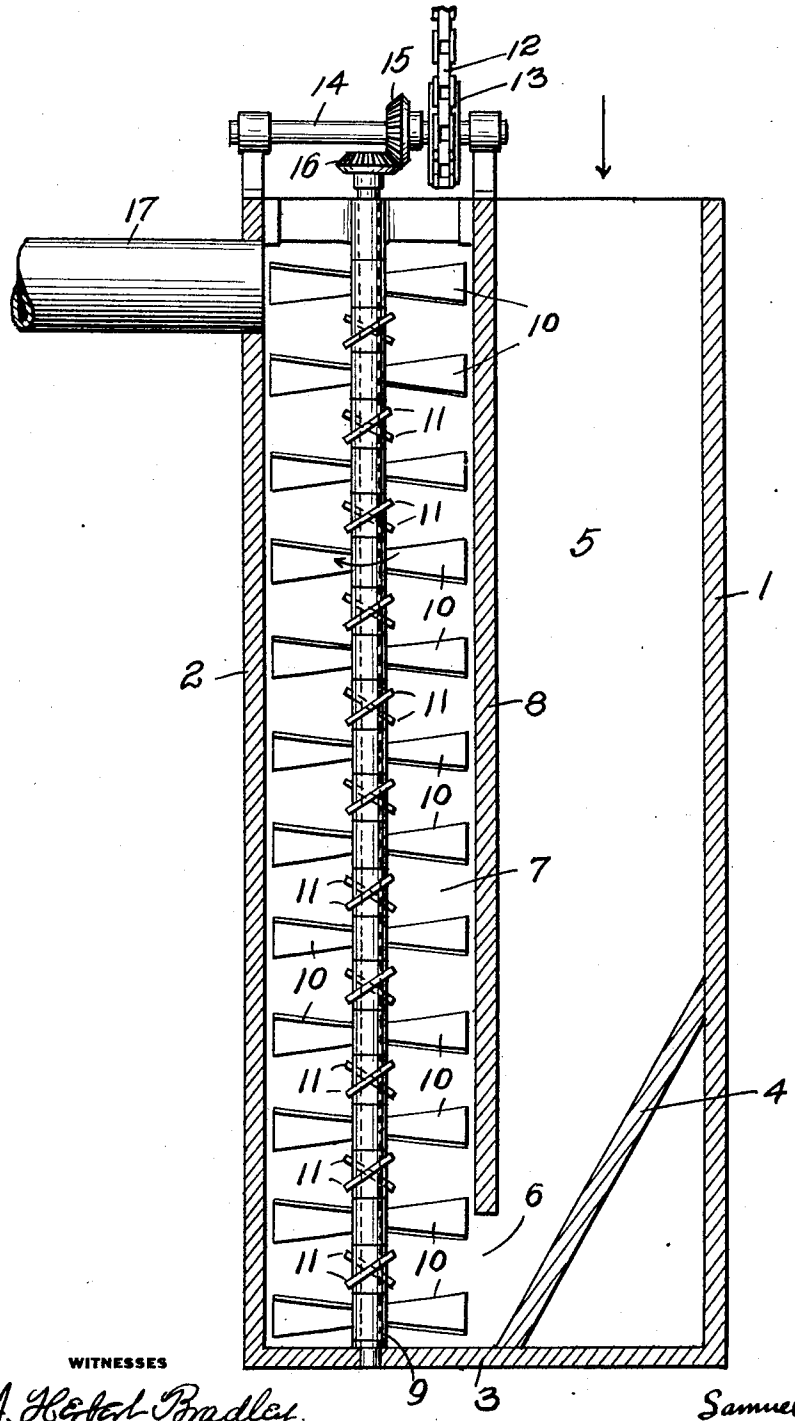
S. L. BOGGS.

SLIME PUMP.

APPLICATION FILED FEB. 27, 1920.

1,383,380. Patented July 5, 1921.



WITNESSES

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SAMUEL L. BOGGS, OF IVANHOE, VIRGINIA.

SLIME-PUMP.

1,383,380. Specification of Letters Patent. Patented July 5, 1921.

Application filed February 27, 1920. Serial No. 361,697.

To all whom it may concern:

Be it known that I, SAMUEL L. BOGGS, a resident of Ivanhoe, in the county of Wythe and State of Virginia, have invented a new and useful Improvement in Slime-Pumps, of which the following is a specification.

This invention relates to pumps, or elevators, and particularly to such devices adapted to handle a mixture of pulverized solid and water.

Among the objects of the invention are to provide an improved apparatus for elevating "slime," *i. e.*, powdered ore and water, or like mixtures, from one level to another. Other objects include the continuous agitation of the mixture being moved, in order to produce suds or froth, and in order to keep solid matter from being deposited. A further object is to provide a device having the least possible wear because of abrasion of the material handled.

The drawing is a vertical central section through the essential parts of my apparatus, the particular embodiments shown being built into the walls of the tank.

In separating ore from gangue by the flotation process, by such apparatus for example as described in my co-pending application Serial No. 331,014, the material to be separated, having first been pulverized, is fed into a large tank full of water, containing a sud-forming element, such as a small quantity of oil. The mixture is then beaten rapidly by revolving paddles, and is circulated through the tank in such manner that ore particles are caught in the froth at the top of the tank, while the gangue falls to the bottom. The ore is passed with the suds to a settlement tank, from which it is removed by some sort of conveyer. Likewise with the gangue, which must also be removed.

The present invention deals with a pump, or conveyer, for moving such mixtures of ore or gangue and water. At present either screw conveyers, or centrifugal pumps are used for this purpose. There are disadvantages in each of these. For example the centrifugal pump is very rapidly worn out by abrasion of the particles of ore or gangue against the pump casing. The screw conveyers require considerable space, are apt to become clogged, and cannot handle the material until it has thoroughly settled out of the water or suds carrying it.

The present invention avoids these difficulties, by providing means for elevating or moving the solid material without separating it entirely from the water in which it has been suspended, but on the contrary carrying it along with enough water to keep it in suspension. The form of the pump is such as to rapidly agitate the mixture, thus preventing any settlement of the particles, and therefore securing a free fluid transfer of the solid material from one level to another.

Referring to the drawing the pump is shown applied to a tank having walls 1 and 2, bottom 3 and an inclined side wall 4. As here illustrated the walls of the tank are those of a settlement or deposit chamber of an ore concentrating system. That is, ore, or gangue, in pulverized condition, is passed into the chamber 5, formed by the walls of the tank above referred to, and normally settles to the bottom thereof. The inclined wall 4 tends to collect the powdered material at one side, that is at the opening 6 in the side of the pump chamber 7, the wall of which is numbered 8, as shown.

The pump casing may be either independent, or built into the wall of the tank as shown. The pump comprises the casing referred to, a vertical rotary shaft 9, and a series of paddles 10 and 11 mounted on the shaft. These paddles are set at an angle of about thirty-seven degrees from a horizontal plane, and the adjacent pairs 10 and 11 are at right angles to each other. The shaft is rotated clock-wise, being driven by a chain 12 connected to any suitable source of power and acting through gear 13, shaft 14, and bevel gears 15 and 16, the latter of which is keyed to the end of shaft 9, as illustrated. At the top of the pump casing a lateral outlet pipe 17 is provided.

A mixture of pulverized ore or gangue being received in the chamber 5, the solid matter settles to the bottom and is delivered to the pump through inlet 6. The pump shaft is driven rapidly, say twelve hundred revolutions per minute. The paddles create a strong upward current through the pump casing, which draws a mixture of ore and water from the bottom of the tank. This is the mixture that is called "slime." At the top the mixture flows out through pipe 17, and by it is led to any desired place, as for example a dump in the case of gangue, or a storage tank, in the case of ore. The

paddles revolving very rapidly, and being of a considerable number, keep the material thoroughly agitated, and where oil or other suitable elements are contained therein, tend to continuously produce the necessary froth or suds for separating ore from a mixture with gangue.

It will be obvious that this pump may be applied at any desired place in an ore separator, to remove pulverized solids from the bottom of the tank to another tank, or to another chamber of the same tank. By its use a series of agitating and separating tanks may be connected for *seriatim* treatment of the same mixture, where extreme concentration is required. Ordinarily it has been the custom to connect such a series of tank units in a step-down arrangement, each subsequent tank being situated lower than its preceding tank, in order to facilitate transfer of the mixture from the preceding tank.

Furthermore, the pump casing may be made of wood, of polygonal shape, so that the casing may be readily repaired, or entirely built by the ordinary mine carpenter.

The many uses and advantages of the device will be apparent to those familiar with the art.

I claim:

1. In a flotation machine, the combination of an inclined bottom, a vertical casing situated at the foot of the inclined bottom and having an opening adjacent to the base of said incline, a shaft in the casing, paddles on the shaft adapted to lift the liquid through the casing, and means to actuate the shaft.

2. The combination with a settlement tank of an inclined member positioned at the bottom of the tank, a vertical casing positioned at the foot of the inclined member, an opening at the bottom of the casing, an outlet at the top of the casing, a shaft in the casing, paddles on the shaft, said paddles being uniformly turned out of the plane perpendicular to the axis of the shaft, and means to drive the shaft.

In testimony whereof I have hereunto set my hand.

SAMUEL L. BOGGS.

Witnesses:

ALICE A. TRILL,

JO. BAILY BROWN.