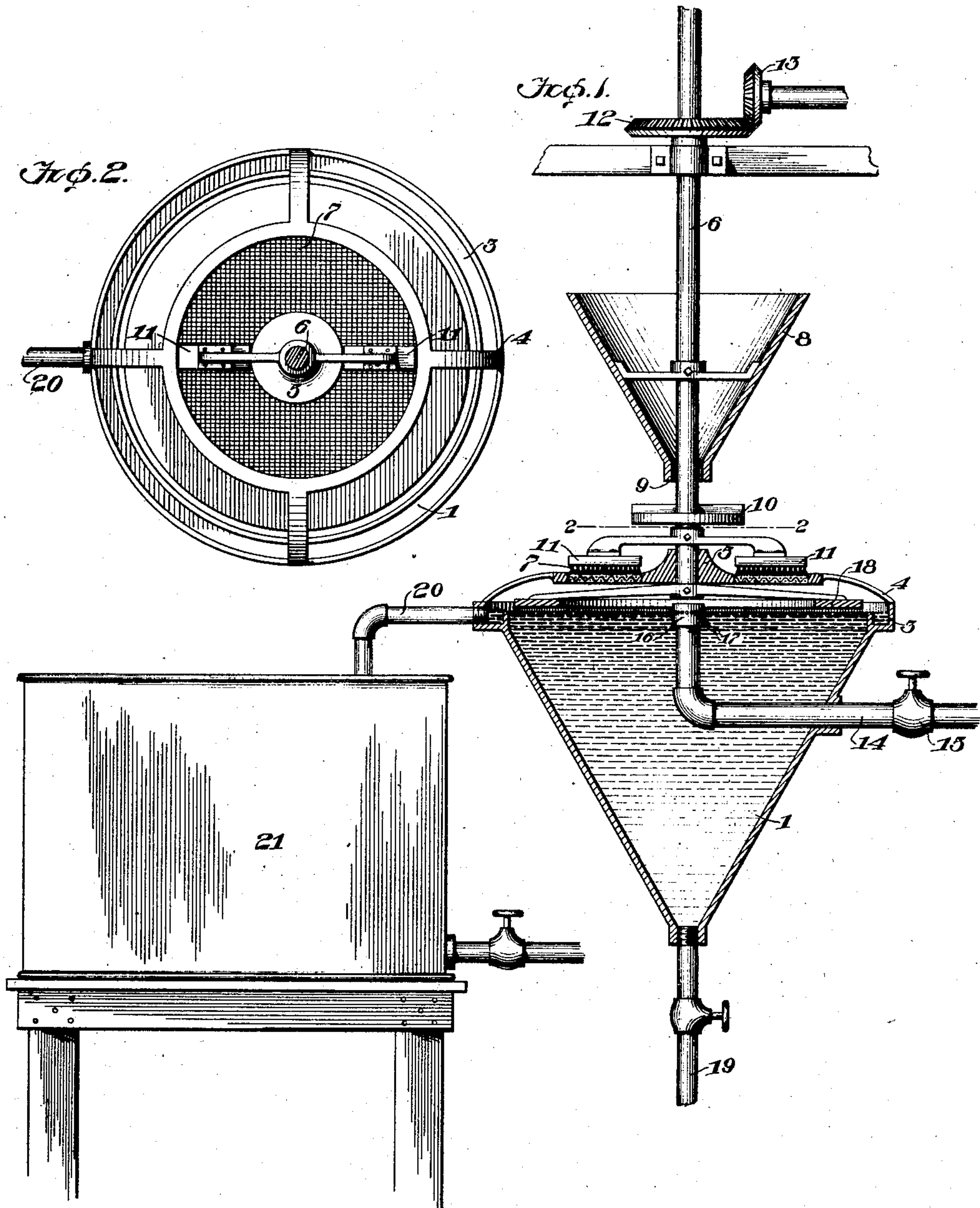


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 APPARATUS FOR SEPARATING MINERALS FROM THEIR ORES.
 APPLICATION FILED DEC. 26, 1908.

973,467.

Patented Oct. 25, 1910.



WITNESSES:
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SAMUEL K. BEHREND, OF DENVER, COLORADO.

APPARATUS FOR SEPARATING MINERALS FROM THEIR ORES.

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Specification of Letters Patent.

Patented Oct. 25, 1910.

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To all whom it may concern:

Be it known that I, SAMUEL K. BEHREND, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Apparatus for Separating Minerals from Their Ores, of which the following is a specification.

My invention relates to an improvement in apparatus for separating minerals from their ores.

My purpose is to treat, for the most part, very fine material, and the object is to separate the flaky mineral from the coarser ore, and effect a maximum percentage of saving of the flaky particles which hitherto have been difficult, if not absolutely impossible to save in the well-known methods of classification, separation, and concentration.

With the foregoing object in view, this invention comprises a tank with means for supplying a steady and uniform flow of water approximately at the surface whereby as little agitation and disturbance of the water surface takes place as possible, and means for supplying or sifting, as it were, the mineral from a point above gently down upon the surface of the water in more or less finely divided particles, in connection with means for raking through the flaky particles floating on the surface of the water previous to their passage from the tank, whereby the coarser particles are liberated and allowed to drop to the bottom of the tank, to be subsequently treated to preserve the values, and means for taking care of and preserving practically the entire mass of floating mineral, whereby an approximately perfect separation takes place.

In the accompanying drawings:—Figure 1 is a vertical sectional view, and Fig. 2 is a section on the line 2—2, of Fig. 1.

In the illustrated form of my present invention, a tank 1, of inverted cone-shape, is shown, in which the separation of the ore takes place. This tank 1 is provided at the upper end with an annular trough 3 into which the water contained in the tank overflows more or less uniformly at every point, carrying with it the floating values. A spider 4 is mounted above the tank carrying at the center a bearing 5 in which the lower end of the shaft 6 is journaled. Surrounding this bearing 5 is an annular screen 7 of suitable material through which the ore is sifted and fed upon the surface of the water

immediately below. By distributing said dry, finely pulverized ore over and upon an area of moving water having an induced outward current, a large percentage of this grade of mineral will float, the gangues of the slimes and the coarser granulated fractions sinking to the bottom of the tank or receptacle containing the water.

The shaft 6 carries a hopper 8 into which the ore is fed. This has outlet 9, at the lower end through which the ore descends upon a circular table 10, also carried by the shaft, and this table 10 is of sufficient diameter and so located above the screen that the ore is more or less equally distributed from its edges upon the screen. The brush or brushes 11, 11, two of which are illustrated, are carried by the shaft 6, in position to traverse the screen 7 to cause the ore to drop through this machine upon the surface of the water. The shaft 6 is revolved through any suitable gearing, such as shown at 12 and 13.

Water is supplied through a pipe 14 controlled by the valve 15, and it issues through nozzle 16, having circumferential series of relatively small orifices 17, 17, which are preferably located as near as possible to the water level. This nozzle might be adjusted more or less up and down by means of screw-threads to regulate its exact elevation with respect to the upper edge of the tank.

An annular rake 18 is held just above the surface of the water, and preferably just within the outer edge of the tank, and moves with the shaft. The teeth of this rake extend down below the water surface whereby any lumpy particles carried by the flaky mass which floats upon the surface are liberated, which particles when freed, drop to the bottom of the tank and flow off through the outlet pipe 19.

The floating flaky film remaining on the surface flows over the edge of the tank into the trough 3 and out through the pipe 20 into a filter tank 21 below, where it is separated from the water. The discharge of the water through the orifices 17, 17, in the nozzle 16, gives a uniform outward impulse to the surface of the water without creating a perceptible agitation or rippling of the surface, which would be more or less disastrous, to the success of this present plan of separation.

More or less slight changes might be resorted to in the form and arrangement of

the several parts described without departing from the spirit and scope of this invention, and hence I do not wish to limit myself to the exact construction herein set forth, but:—

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

1. The combination with a separating tank adapted to contain liquid, and a pipe which discharges radially at the center of the tank and at the surface of the liquid therein, of a barrier located between the water inlet and overflow said barrier having members in the path of material floating thereon, and a screen located above the tank between said means and the water outlet, for sifting the material to be treated upon the surface of the liquid in the tank.

2. The combination with a tank having an annular overflow trough, a water supply pipe leading to a point at or near the center of the tank and having a nozzle with an annular series of orifices located approximately in the horizontal plane of the upper edge of the tank whereby the water issues therefrom radially approximately coincident with the water level in the tank, of a device located between the water outlet and the overflow and extending into the path of the outwardly floating material for disintegrating the material carried on the surface of the water.

3. The combination with a tank having an annular overflow trough, a water supply pipe leading to a point at or near the center of the tank and having a nozzle with an annular series of orifices located approximately in the horizontal plane of the upper edge of the tank whereby the water issues therefrom radially approximately coincident with the water level in the tank, of means located between the water outlet and the overflow, and in the path of the outwardly floating flakes for separating the material carried on the surface of the water, and means located at the bottom of the tank for the discharge of separated material therefrom.

4. The combination with a tank having an annular overflow trough, a water supply pipe leading to a point at or near the center of the tank and having a nozzle with an annular series of orifices located approximately in the horizontal plane of the upper edge of the tank whereby the water issues therefrom

radially approximately coincident with the water level in the tank, of a barrier having members located between the water outlet and the overflow, and in the path of the outwardly floating flakes carried on the surface of the water, and means for sprinkling the material to be separated upon the surface of the water at a point between the water supply and the overflow.

5. The combination with a tank, of a spider having an annular screen thereon located above the tank, a rotary shaft carrying a hopper at a point above the screen, a table upon which the contents of the hopper are discharged upon the screen, and brushes which traverse the screen for sprinkling the material to be separated from the screen upon the surface of the water in the tank.

6. The combination with a tank, of a spider having an annular screen thereon located above the tank, a rotary shaft carrying a hopper at a point above the screen, a table upon which the contents of the hopper are discharged upon the screen, brushes which traverse the screen for sprinkling the material to be separated from the screen upon the surface of the water in the tank, a pipe at the top of the tank which discharges water approximately at the superficial center of the water in the tank.

7. The combination with a cone-shaped tank adapted to be filled with water and to overflow at its outer edges, and a water supply pipe which discharges approximately at the center of the surface of the water in the tank toward the outer edges of the tank, of an annular screen overlying the water surface between the water inlet and discharge for sifting the material to be treated upon the surface of the water in the tank.

8. A separating tank having centrally located means for supplying water approximately in the horizontal plane of its overflow, means for sprinkling the material to be separated upon the surface of the water, and an annular device having means for separating the material floating on the water in the tank.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL K. BEHREND.

Witnesses:

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H. L. CLUTSAIN.