May 12, 1925. 1,537,424

W. G. ELMS

GRAVITY CONCENTRATOR

Filed April 17, 1924

Fig. 1.

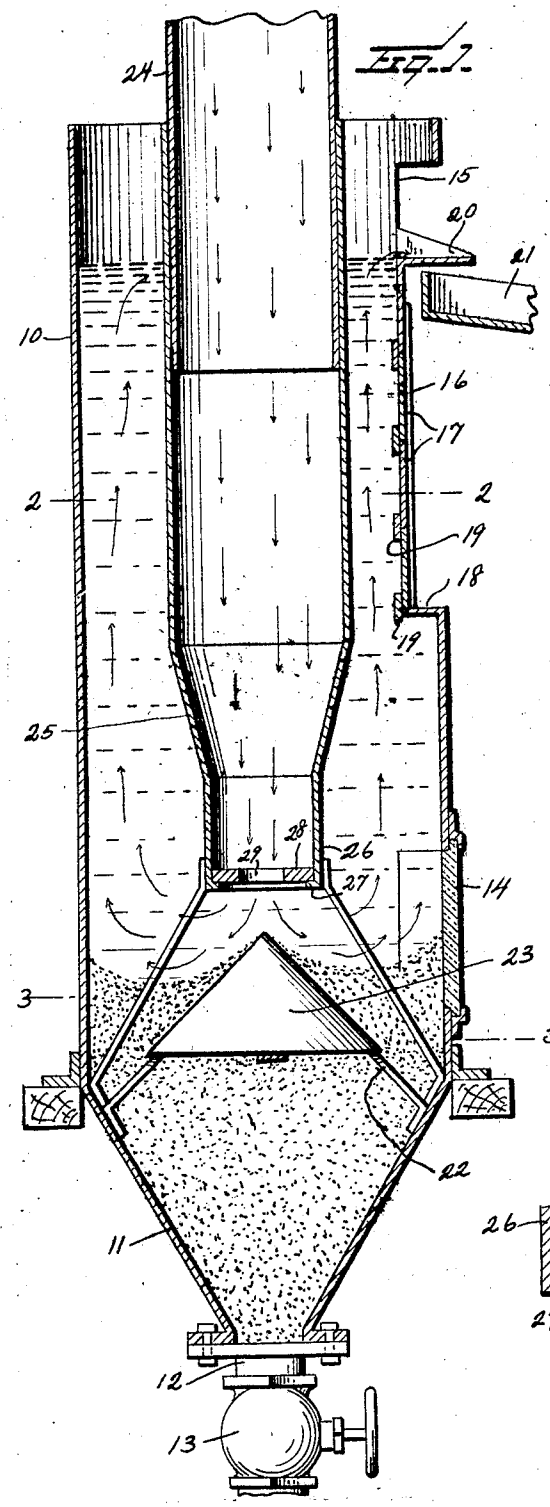


Fig. 2.

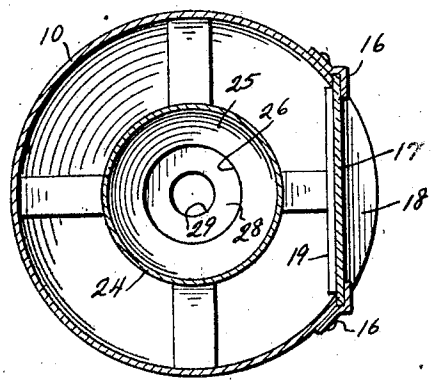


Fig. 3.

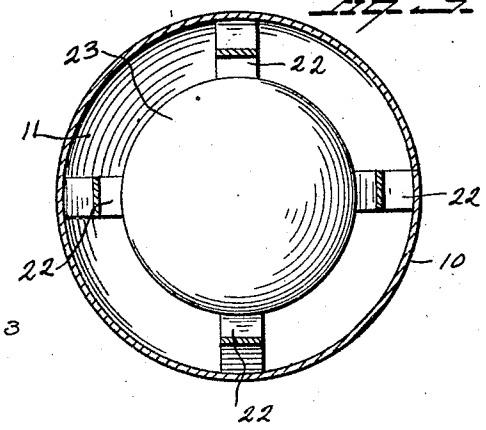
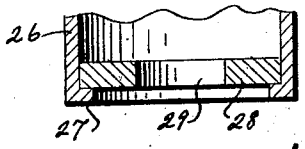


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM G. ELMS, OF OAKLAND, CALIFORNIA.

GRAVITY CONCENTRATOR.

Application filed April 17, 1924. Serial No. 707,185.

To all whom it may concern:

Be it known that I, WILLIAM G. ELMS, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Gravity Concentrators, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to gravity concentrators and more particularly to that class of concentrators for separating extremely fine values such as are often referred to as flake gold because of the inability of the particles to break the surface of the water upon which they rest and accordingly their tendency to float upon the water.

It will be obvious that such values will be extremely difficult to remove from water and more difficult to separate and remove from slime and finely divided substances with which they are intermingled during the process of concentration. An important object of the invention is to provide a device for submerging such small values in all three dimensions so that their specific gravity is brought into play to permit separation thereof from the water and at the same time to provide a device which will agitate the fluid in which the values are suspended so that the slime and the like contained within the fluid is carried off and separated from the values continuously. I am aware that this principle of submergence has been previously employed in the separation of small values but apparatus of this character with which I am familiar fails in proper separation due to the fact that slime contained in the fluid is not carried off properly and intermingles with the values rendering a considerably further separation thereof necessary.

A still further object of the invention is to provide a device of this character which may be simply and cheaply constructed, which will be durable and efficient in service and a general improvement in the art.

A further object of the invention is to provide a device of this character which, while primarily intended for use in desliming of the minerals, may be readily employed for desliming other materials as in washing gravel, sand and the like for use in construction.

These and other objects I attain by the construction shown in the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention and wherein:—

Figure 1 is a vertical sectional view through concentrating apparatus constructed in accordance with my invention;

Figure 2 is a section on the line 2—2 of Figure 1;

Figure 3 is a section on the line 3—3 of Figure 1;

Figure 4 is an enlarged detail sectional view showing the mounting of the outlet reducer ring.

Referring now more particularly to the drawings, a casing is employed comprising an upper cylindrical section 10 and a lower downwardly tapering conical section 11, the lower end of this conical section being provided with a discharge pipe 12 having a control valve 13 therein. Immediately adjacent its lower end the side wall of the cylindrical section of the casing is provided with a transparent panel 14 and at its upper end the section has formed in its side wall an opening 15 having arranged along its vertical sides guide brackets 16 combining with the edges of the openings to receive the edges of gate sections 17. At the lower end of the opening the casing is provided with an inturned flange 18 upon which the lowermost gate section 17 rests. Each gate section 17 is provided at its lower edge with a downwardly projecting sealing flange 19. The sealing flange of the lower gate 17 abuts the inturned flange 18 of the casing section 10, while the sealing flanges of the remaining gate sections abut the upper end of the gate section next below. By inserting a desired number of gate sections the height of overflow and the effective depth of the casing 10 may be variably regulated. The uppermost gate section 17 bears an outlet chute or discharge spout 20 by means of which the overflow may be conducted to any suitable flume generally indicated at 21.

Arranged within the casing 10 at the lower end thereof and supported from the walls of the casing by brackets 22 is an upwardly tapering cone 23. Supported axially of the casing is an intake pipe 24 having adjacent its lower end a reducer 25 which tapers downwardly and which is provided at its lower end with an outlet reducer 26. This outlet reducer has an inturned flange 27 upon which are interchangeably mountable a plurality of disks

28 having central openings 29 of different diameters. This outlet reducer is arranged immediately above the upper end of the apex of the cone 23 so that the fluid passing through the inlet pipe is discharged against the cone, the stream varying in size according to the size of the opening of the outlet reducer disk 28 which is employed.

In operation of the device, the inlet pipe 24 receives the discharge from the fine stream of a multiple stream shaker table (not herein disclosed), which consists of the finer particles of values and grit intermingled with water and slime. The inlet pipe 24 is preferably made variable as to effective length so that the head presented from this inlet pipe may be regulated, any suitable construction being employed to effect this result. In the present instance, the inlet pipe 24 is shown as composed of telescopic sections but it will be understood, of course, that this construction is but one of many which might be employed. As the fluid, values and slime pass from the lower end of the inlet pipe against the cone a considerable agitation results. It will be obvious that as soon as the casing becomes filled with fluid the engagement of the incoming fluid against the cone will cause this incoming fluid to take an upward trend toward the upper end of the casing and during this upward movement the flake gold and similar values carried by the stream will be completely submerged and will sink to the bottom of the container in the cone-shaped section 11 thereof. The slime, however, due to the agitation will be so thoroughly mixed with the water that it will be carried upwardly and since the casing is so constructed that the upward speed of the water is not checked at any point, the slime will not be allowed to settle but will be carried off by the water through the outlet 20.

The operation of the device can be observed through the transparent panel 14 and values drawn off from time to time to prevent the upper level of these values from reaching the lower end of the inlet pipe as represented by the lower end of the outlet reducer 26. It will be seen that by adjusting the pressure head of the inlet pipe and the size of the outlet opening 29, the force of the fluid engaging the cone may be regulated and accordingly the degree of turmoil to which the mixture is subjected. It will also be obvious that by changing the depth of submergence an arrangement can be arrived at, at which substantially none of the values are carried off through the overflow and at the same time practically all of the slime and lighter foreign substances contained in the fluid are removed.

It will, of course, be obvious that the construction hereinbefore set forth is capable of a considerable range of change and modification without in any manner departing from the spirit of my invention and I accordingly do not limit myself to such specific structure except as hereinafter claimed.

I claim:—

A concentrator comprising a cylindrical casing having a downwardly tapering lower end, a cone supported within the casing immediately above such lower end, an inlet pipe directed into the upper end of the casing and having its lower end decreasing in size and terminating immediately above and in fixed relation to the cone to discharge thereagainst means for regulating the size of the outlet orifice of the inlet pipe, means for regulating the effective height of the casing and means for regulating the effective head of the inlet pipe, the effective diameter of the casing decreasing at a point spaced above the lower end of the inlet pipe.

In testimony whereof I hereunto affix my signature.

WILLIAM G. ELMS.