Dec. 15, 1942. J. A. BRENT 2,305,568

ORE CONCENTRATOR

Filed Oct. 27, 1941 2 Sheets-Sheet 1

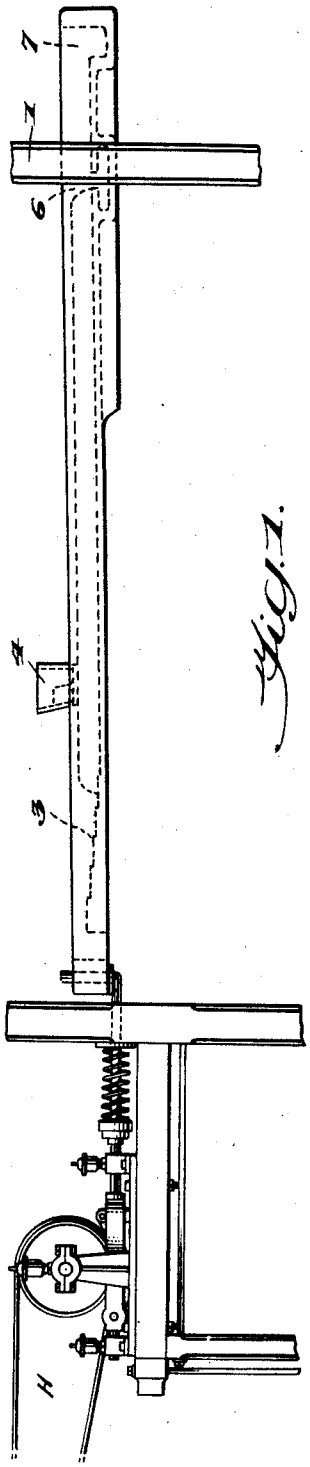


Fig. 1.

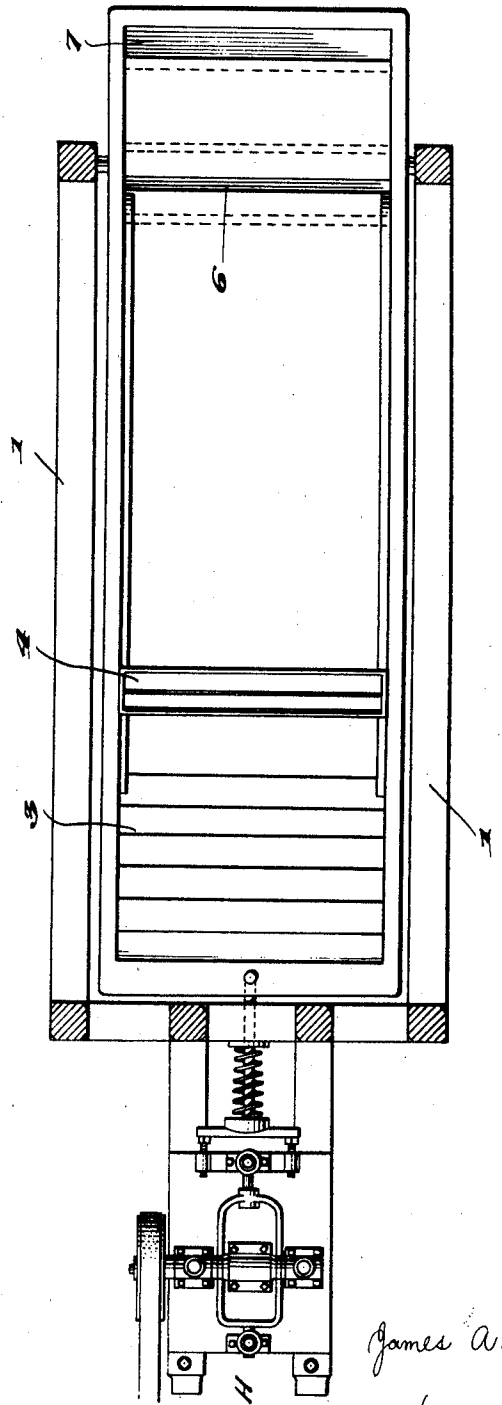


Fig. 2.

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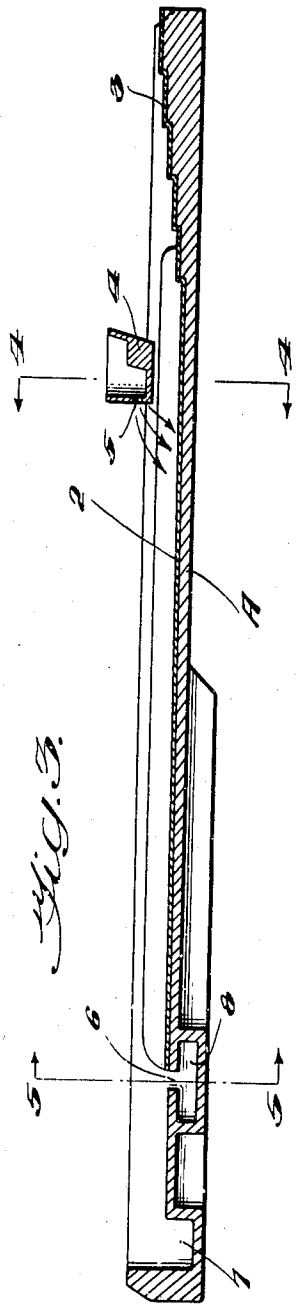


Fig. 3.

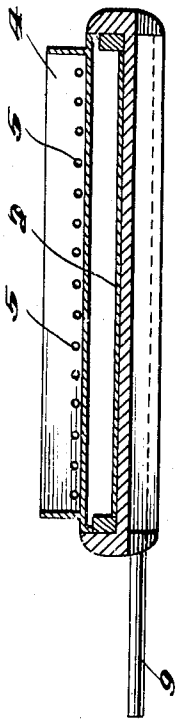


Fig. 4.

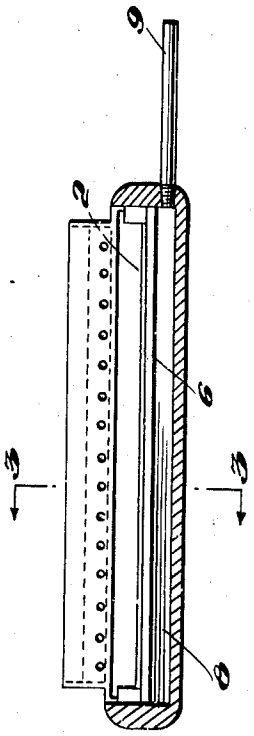


Fig. 5.

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2,305,568

UNITED STATES PATENT OFFICE

2,305,568

ORE CONCENTRATOR

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Application October 27, 1941, Serial No. 416,719

2 Claims. (Cl. 209—437)

Heretofore a well established theory of ore concentration as employed by the well-known Wilfley and Deister concentrating table has been to utilize a reciprocatory action lengthwise of the table or deck while sloping it cross-wise and directing a flow of water transversely of the table.

The fundamental defect has been that the side wash being intercepted by the reciprocal action of the table fails to give the downward pressure necessary to gravitate and bed the fine impalpable values and they pass away with the waste gangue.

While the very popular Frue vanner employs a panning motion and washes lengthwise of its belt or table, there is no clear wash water at the upper or tail end of the table to make a perfect elimination of waste and gravitate the fine impalpable values which pass away with the waste as stated above.

The fundamental object of my present invention is to save these fine particles on the table I have constructed, and which I now describe in connection with the accompanying drawings. I save these hitherto wasted values so that the loss is not only reduced to a minimum but is practically negligible.

To this end my invention consists in a table which slopes gradually from one end to the other, is substantially flat crosswise, and is reciprocated lengthwise, it being so constructed that a pool of water and values is formed and maintained on the major portion of the relatively smooth surface of the table. Despite the end motion which may be regulated to have the length and number of strokes required for the most successful separation, the values debouch into a value box 8 extending across the table near the tail end after they have been separated from the gangue and found their way up the slope of the table to that point. This separation is assisted by the forward flow of water from a water pool trough 7 at the extreme tail end of the table and the feed, the feed-box being located near the head end, and the water and gangue flowing off after the completion of the separation at the head end of the machine.

In the accompanying drawings:

Fig. 1 is a view in side elevation;

Fig. 2 is a plan view;

Fig. 3 is a longitudinal section on the line 3—3 of Fig. 2, omitting the head motion;

Fig. 4 is a transverse section, on the line 4—4 of Fig. 3, through the feed-box, looking in the direction of the arrows; and

Fig. 5 is a transverse section on the line 5—5 of Fig. 3 looking in the direction of the arrows.

The table itself, designated generally by the letter A, is mounted in any approved manner on a frame structure 1, so that it can be reciprocated endwise. The table slopes throughout its length upwardly toward the tail end, as shown in Figs. 1 and 3, the tail end preferably being from four to six inches or so higher than the head end in a table say sixteen feet in length by six feet across, but obviously, lengthwise slope might be varied and probably would be in a table of different dimensions. The head motion is attached at the head end and is designated generally by the letter H. Any reciprocating head motion might be employed, but the one illustrated is the Cooley type of head motion as disclosed in Letters Patent No. 1,262,922, April 16, 1918, and I have found that the strokes might be varied say from two hundred and fifty (250) to three hundred (300) strokes per minute, and in length from one-fourth to one inch.

The above details are obviously subject to change and variation according to the requirements and the character of the ore pulp being treated.

My present invention resides more particularly in the construction of the table itself, and will now be described. The surface of the major portion is composed of sheet copper 2, preferably made in one piece and by preference relatively smooth. The head end is traversed by the transverse cross-riffles 3 in the general form of shallow steps.

The numeral 4 represents the feed-box. This might be variously constructed, but it is preferably located near the head end and moderately close to or over the transverse cross riffles 3. This is provided with outlets 5 through which the pulp is fed to the surface of the table.

Extending across the tail end of the table is an outlet 6 through which the values flow off from the table. A dead water pool trough 7 extends across the table at or near the extreme tail end.

In operation, the water flows off over the riffles 3 at the head end where the head motion is attached. The ore feed extends from the feed-box 4 to be graded toward the outlet 6, as shown by the arrow in Fig. 2. The water-feed from the dead pool trough 7 flows lengthwise of the table in the opposite direction from the ore feed.

Operation.—The table when in operation is level sidewise while the tail end is elevated, giving the table any desired grade lengthwise to control the flow of wash water and the travel of the bedded values.

The gangue is fed on the table from the feed-box **4** and is propelled up-grade toward the tail end and comes in contact with the wash water which overflows from the dead pool trough **7**. This gives a back wash and head wash, washing back the waste, which debouches below the feedbox over the low riffles **3** at the head end of the table, the shallow riffles aiding in the bedding of the values.

The gangue is practically fed into the major pool below the feed-box, and the driving impact settles the values before they reach the outlets **6** into which they gravitate and lead to the value tank **8** below.

This tank **8** is gradually drained from the bottom through a pipe **9** in such a manner that it does not disturb the water at the outlet **6** on the surface of the table. In gravity concentration, every value particle—no matter how impalpable and small—has its gravity and resistance to any force of wash water. When the force of the water exceeds the gravity resistance of the value particle, the latter will move in any direction to which it is propelled.

What really happens on my improved type of table is that advantage is taken of the indisputable fact that as the gangue is propelled up-grade against the overflow water from the dead pool trough **7**, it has a downward pressure of wash, and the value particle, aided by its gravity, beds on the table. In this way gravity concentration is amplified and revolutionized. In practice, I have employed this method as stated above in the most minute detail and the value loss is only a negligible trace. When the finest values are once bedded, they are more tenacious and impervious to the wash than larger values are. The grade of the table and the length of the stroke of the head motion governs the speed of travel of the value to bed as it is gradually driven toward the outlet **6** below the water pool.

The waste has a rapid elimination at the lower or head end of the table, while the grade of the table and the length of stroke can be so adjusted as to give all the time necessary to settle and to bed before the bedded value reaches the outlet **6** above the value tank **8**.

I claim:

1. An ore concentrator including a reciprocating table, the surface of which has an upward slope from the head end toward the tail end and is approximately flat crosswise, means located at one end of the table for applying an endwise motion only to the table, the major portion of the surface of the table being relatively smooth, transverse riffles extending across the head end in the general form of shallow steps, a dead pool trough located approximately at the extreme opposite end of the table and extending transversely thereof, the trough being closed at its ends, the table having an outlet extending transversely thereacross near its tail end, a value tank therebeneath in position to receive the values from the outlet, and a pulp feed box extending across the table at a point near the lower end of the relatively smooth surface of the table where the pool formed between the riffles and the outlet is deepest and subjected to a minimum of the agitation due to the reciprocating action of the table.

2. An ore concentrator including a table having a general upward slope from the head to the tail end, a plurality of transverse stepped riffles at the head end, a dead pool trough extending transversely of the table at one end thereof, said trough being closed at its ends, a value tank slightly removed from the trough, a value outlet from the table to said tank, the major part of the surface of the table being relatively smooth and uninterrupted and approximately level crosswise of the table and reaching from the value outlet to the base of the stepped riffles over which surface the pulp is fed, a pulp box located above this relatively smooth and uninterrupted surface and at the lower end of the table in position to discharge its contents at a point adjacent to the stepped riffles and where the pool formed between the value outlet and the riffles is deepest, and means located at one end of the table for applying endwise reciprocating motion only thereto.

JAMES A. BRENT.