

July 13, 1937.

E. E. LYNCH

2,087,092

CONCENTRATOR

Filed Dec. 19, 1934

2 Sheets-Sheet 1

Fig. 1.

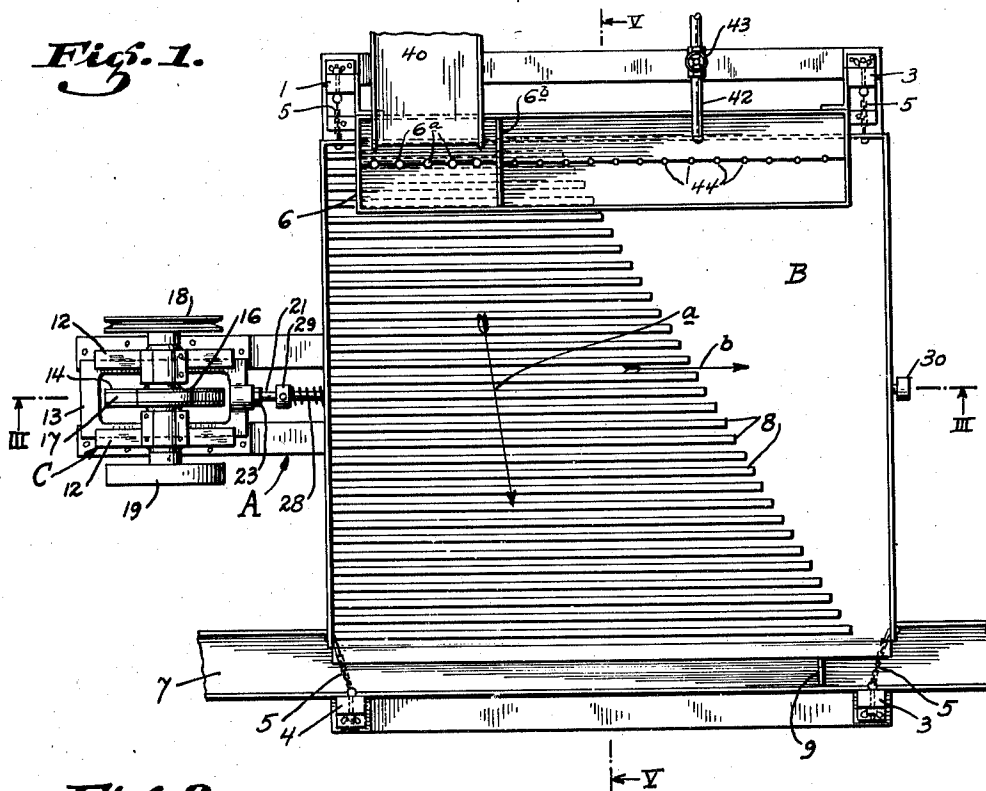
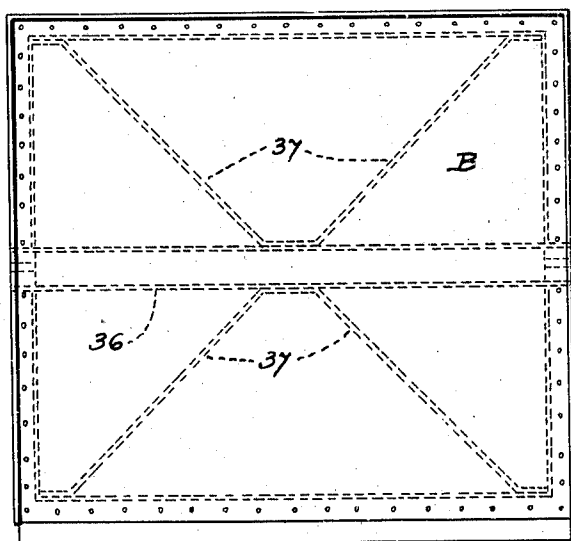


Fig. 2.



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2 Sheets-Sheet 2

Fig. 3.

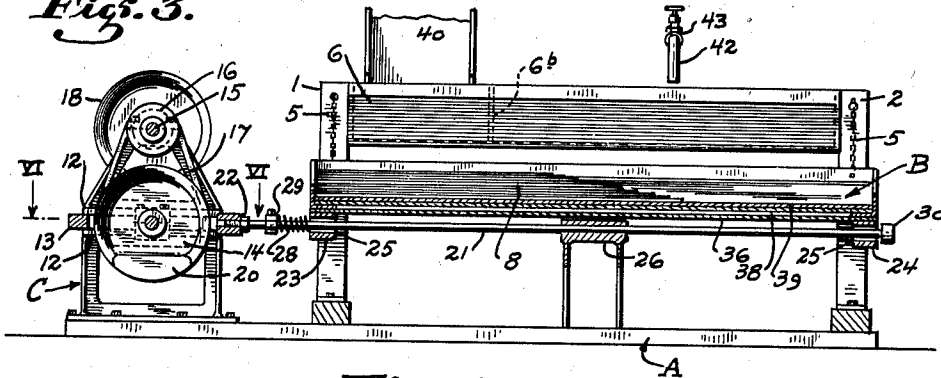


Fig. 4.

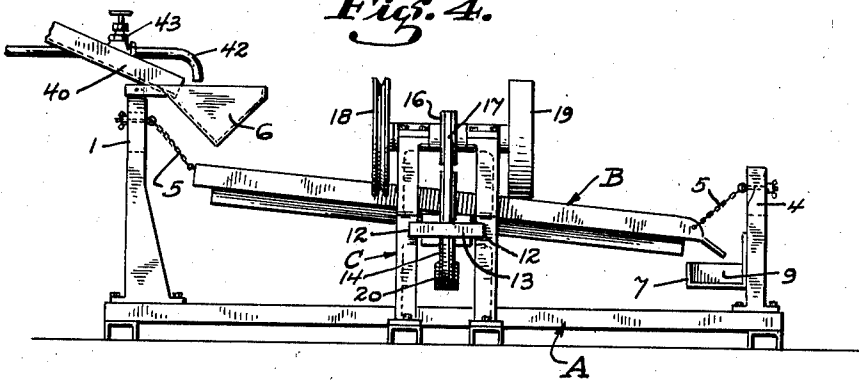


Fig. 5.

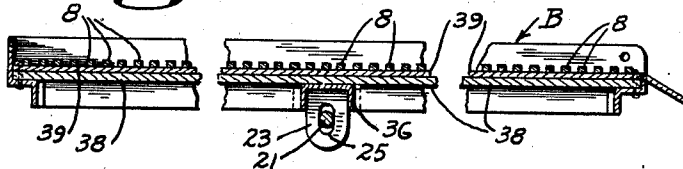
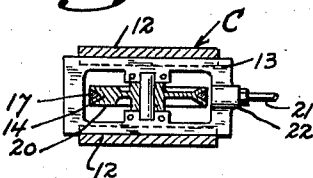


Fig. 6.



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CONCENTRATOR

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3 Claims. (Cl. 209—441)

This invention relates to ore concentrators and especially that type in which the ore pulp is fed to a table and there subjected to a concentrating action.

The object of the present invention is to generally improve and simplify the construction and operation of concentrators of the character described; to provide a flexible table surface to which a vertical and a horizontal movement are transmitted to prevent packing of the concentrates behind the riffles; to provide a novel form of table suspension whereby a swinging movement is transmitted to the table as a whole; to provide means whereby movement is transmitted to the table in opposite directions one movement being comparatively gentle and cushioned and the reverse movement being rapid and imparted by impact or hammer action; to provide an unbalanced pulley for transmitting the cushioned and impact movement; and, further, to provide a concentrating table of light weight, requiring small power application and yet insuring large capacity and ease of adjustment.

The concentrator is shown by way of example in the accompanying drawings, in which—

Fig. 1 is a plan view of the concentrator.

Fig. 2 is a plan view of the concentrating table showing the riffles removed.

Fig. 3 is a vertical cross section, taken on line III—III of Fig. 1.

Fig. 4 is a side elevation of the concentrator.

Fig. 5 is a longitudinal section of the table, taken on line V—V of Fig. 1.

Fig. 6 is a horizontal section, taken on line VI—VI of Fig. 3.

Referring to the drawings in detail and particularly Figs. 1, 3, and 4, A indicates a rectangular frame constructed of timber, structural steel beams, or the like. Secured at each corner of the frame is a post, such as indicated by the numerals 1, 2, 3, and 4, and suspended between the posts, by means of chains 5 or similar means, is a concentrating table generally indicated at B. This table is disposed on an incline, such as shown in Fig. 4, and the ore pulp or other material containing concentrates or the like to be removed is delivered to the upper end thereof by a feed launder or trough 6 which also supplies water, as will hereinafter be more specifically described.

The ore pulp or waste in passing over the table travels in the general direction of arrow *a* (see Fig. 1) and discharges from the lower end of the table into a waste launder 7. The concentrates, on the other hand, travel in the general

direction of arrow *b* towards the ends of the riffles, indicated at 8, and pass from riffle to riffle and are finally discharged over the lower end of the table into the right-hand end of the launder 7, a partition plate 9 being placed in the launder to separate the waste from the concentrates.

Movement is transmitted to the table in a direction substantially at right angles to the flow of the material passing over the same, the movement in one direction being imparted in the form of an impact or hammer blow, while the reverse movement is gentle in comparison as it is transmitted through a spring or similar resilient means.

One manner in which the movement described may be transmitted is best illustrated in Figs. 1, 3, and 6. In these figures a frame C is shown which is supported by an extension of the frame A. Formed on the inner surfaces of the frame are slideways 12, and slidably mounted therein is a sliding frame or cross-head 13 in which is journaled a pulley 14. Extending crosswise of the upper portion of the frame and journaled therein is a shaft 15, and secured thereon is a pulley 16 which is connected with the pulley 14 by means of a belt 17. Power is transmitted to shaft 16 through a pulley 18 and a small flywheel, or the like, is secured on the opposite end of the shaft, as indicated at 19, to maintain the revolutions of the shaft 16 as constant as possible. When power is transmitted to shaft 15 obviously it will be transmitted through belt 17 to rotate the pulley 14. This pulley, as previously stated, is journaled in the sliding frame or cross-head 13, and as the pulley is provided with a weight 20 which unbalances it a reciprocal movement will be transmitted to the cross-head 13.

Extending below the table and crosswise thereof is a rod 21. One end of the rod is secured to the cross-head at the point indicated at 22. Hence as the cross-head reciprocates a similar movement will be transmitted to the rod 21. At opposite sides of the table and below the same is secured a pair of anvil blocks, indicated at 23 and 24. These blocks are provided with elongated slots 25 through which the rod 21 extends so that the rod has a free movement with relation thereto, but the rod is otherwise supported by a central bearing 26 secured to the main frame.

Surrounding one end of the rod is a spring 28. This spring is interposed between the anvil block 23 and an adjustable collar 29 so that any tension desired may be applied. The opposite end

of the rod is provided with a head member 30. This head member imparts an impact or hammer blow to the anvil member 24 and the table to which it is secured when the rod moves in one direction. The spring 28, on the other hand, imparts a gentle movement to the table in the reverse direction as the movement is cushioned by means of the spring 28. The movement, as previously stated, is substantially at right angles to the flow of material over the table. Hence when the spring engages the table and moves it in the direction of arrow *b* the pulp and concentrates carried by the table are moved in that direction; but when the impact blow is transmitted to the table in a reverse direction the table moves from in under the concentrates and it is by this action that they are advanced along the riffles in the direction of arrow *b*.

In view of the fact that the table is suspended from the posts 1, 2, 3, and 4 by means of the chains 5 it is obvious that a swinging movement is simultaneously transmitted to the table. This movement has a tendency to throw or lift the pulp and concentrates and thus prevents packing of the same behind the riffles. There is still another movement, to-wit, a vibratory or vertical movement which is imparted to the concentrating table surface and that is due to the character of the material employed in forming the table surface and the impact action of the head or hammer member 30.

By referring to Figs. 2 and 5 it will be noted that the concentrating table consists of an exterior surrounding frame constructed of metal, or the like, which is substantially Z-shaped in cross section. Extending crosswise of the table or the frame just described is a channel bar 36. This channel bar is welded or otherwise secured to the Z-bar frame and it is further secured by angular braces, such as indicated at 37. The Z-bar frame, together with the channel bar and the angle braces 37, forms a rigid frame on which the material forming the surface of the table is supported and secured; the material employed being a laminated panel, preferably constructed of wood or like material, or, plainly speaking, a plyboard panel. This panel is indicated at 38 and it is riveted or otherwise secured around its peripheral edges to the Z-bar frame, but it is not secured at any other point. This plyboard panel is covered with linoleum or similar material, as shown at 39, and the riffles 8 are, in turn, secured thereto.

A table surface constructed and supported in this manner functions very much like the covering of a drum. It is exceedingly light and flexible and when an impact blow is struck by the head or hammer member 30 vibrations are set up in the surface of the table very similar to those produced on the head of a drum when it is struck by a drumstick. These vibrations are in a vertical direction and impart movement to the pulp and concentrates which further aid in preventing packing and in maintaining the material in the condition where concentration can be efficiently, effectively, and rapidly accomplished.

The anvil members 23 and 24 are welded or otherwise secured at opposite ends of the channel bar 36 extending crosswise of the frame. Hence when the transverse movement is imparted to the table it is efficiently transmitted, the degree of movement imparted being determined by the tension of the spring 28 and by the speed of rotation of the unbalanced pulley

15. The incline of the table, of course, may be adjusted by raising or lowering the chains. The pulp to be concentrated is delivered by a launder 40 into the left-hand end of the feed launder 6. This launder is V-shaped, as shown in cross section, and holes or perforations 6^a are formed in the bottom thereof through which the pulp and concentrates are delivered to the upper end of the table. A partition plate 6^b extends crosswise of the launder and separates it into two divisions. Water is delivered to the second division through a pipe 42 and its flow is regulated by a valve 43 in the usual manner. The water is evenly distributed by discharging it through perforations 44 formed in the bottom of the launder.

As previously described the pulp, when delivered to the table, will flow in the general direction of arrow *a* while the concentrates will lodge behind the riffles 8 and travel in the direction of arrow *b* when the impact blow is imparted to the table and will pass from riffle to riffle until it finally discharges over the lower end of the table into the right-hand end of the launder 7. The waste, on the other hand, will travel in the general direction of arrow *a* and will discharge into the launder 7 and by adjusting the position of the partition plate 9 the richness of the concentrates may be increased or decreased, as desired.

The weight of a concentrating table constructed in the manner here described is very small when compared with standard types of concentrating tables and as the concentrating movement is imparted by the action of an unbalanced pulley the power input required is exceedingly small. A table presenting an area of approximately twenty to thirty feet requires no more than a one-quarter horsepower motor.

Actual practice has shown that the concentrating action is very rapid and the capacity of the table large and further that it is possible to separate materials having a very slight difference in specific gravity, thus making it possible to handle ores and other materials of almost any character.

While the hammer 30 is in this instance shown in the position to engage and strike the anvil block 24, it may be placed on the opposite side of the anvil block 23. In that instance it is possible to eliminate the central bearing 26 and to very materially reduce the length of the rod. With some ores this arrangement may be employed and with other ores it is desirable to impart the impact action from the opposite side of the table, as shown in Fig. 3. While this and other features have been more or less specifically described and illustrated, I wish it understood that changes may be resorted to within the scope of the appended claims; and similarly that the materials and finish employed may be such as the manufacturer may dictate or varying conditions may demand.

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

1. In a concentrator of the character described, a concentrating table comprising a rigid frame, a panel covering said frame, means securing the panel at its peripheral edges only to the frame, a rigid bar extending transversely of the panel and frame and rigidly secured to the frame, an anvil member secured at each end of the bar, means supporting the concentrating table in a suspended condition and permitting transverse movement of the table, a resilient member en-

engageable with one anvil, an impact member engageable with the other anvil, and a power-driven unbalanced pulley whereby the resilient and the impact members are actuated, independently of the table.

2. The combination of a concentrating table, of means for transmitting a reciprocal movement thereto in a direction transverse to the flow of material over the table, said means comprising a frame, a cross-head reciprocally mounted in the frame, an unbalanced pulley journaled in the cross-head, a pulley journaled in the frame, means for driving said pulley, a belt drive between said pulley and the unbalanced pulley to rotate the latter and to cause reciprocal movement of the cross-head, a rod connected to the cross-head and extending under the table, an anvil block at each side of the table, a hammer member secured on the rod and engageable with one anvil to impart an impact blow thereto, and a spring carried by the rod and engageable with the other anvil to impart a reverse movement to the table.

3. In a concentrator of the character described a concentrating table comprising a rectangular shaped frame, a thin plyboard panel covering said frame, means securing the panel at its outer edges only to the frame, a channel iron bar secured to the frame and extending crosswise thereof, an anvil member secured at each end of the channel bar, a reciprocal member extending under the frame parallel to the channel bar, a hammer member carried by the reciprocal member and engageable with one anvil when the reciprocal member moves in one direction and a resilient member carried by the reciprocal member and engageable with the anvil on the opposite end of the channel bar when the reciprocal member moves in the opposite direction, said plyboard member being sufficiently thin and flexible to permit vertical vibratory waves to pass therethrough when the anvil is struck by the hammer.

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