Oct. 28, 1924 1,513,693

W. A. BUTCHART

ORE CONCENTRATOR

Filed Feb. 13, 1923

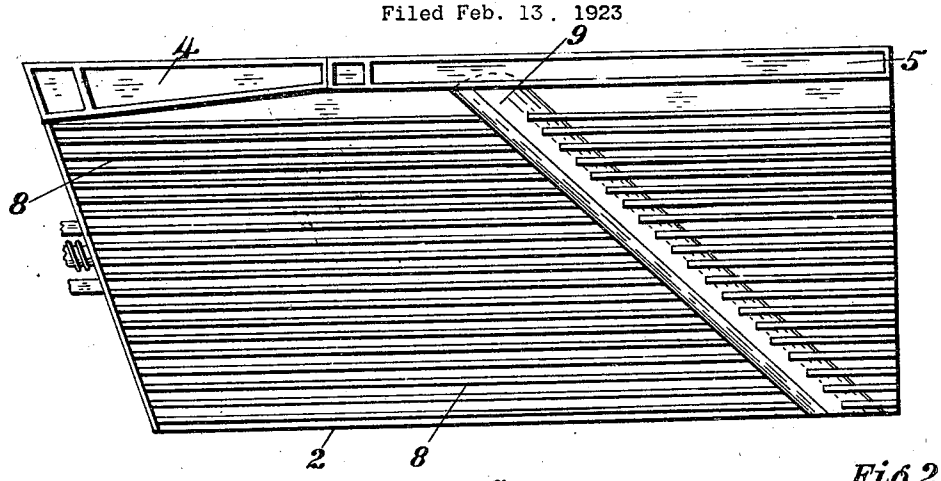


Fig. 2.

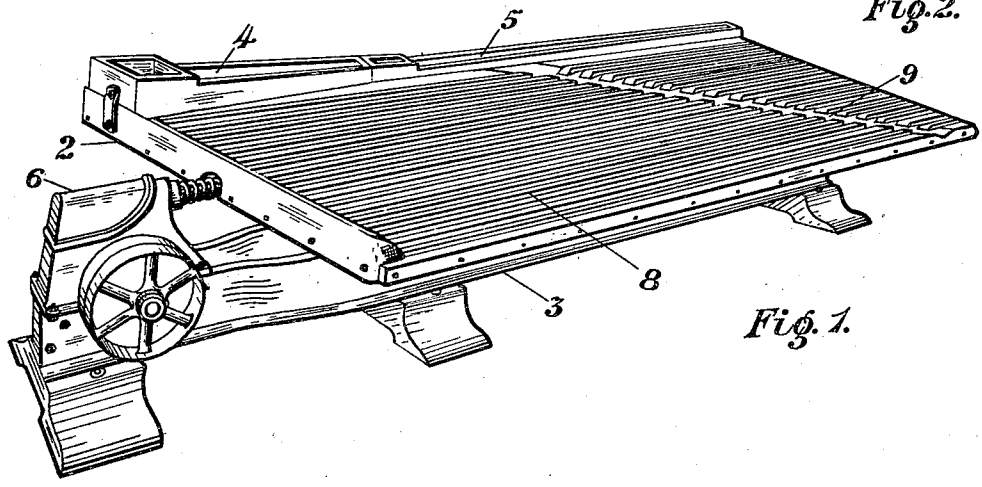


Fig. 1.

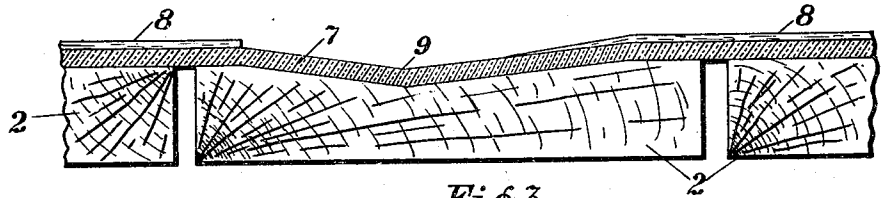


Fig. 3.

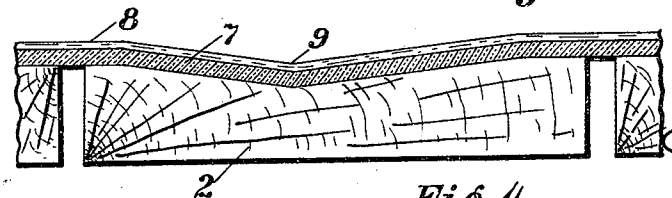


Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM A. BUTCHART, OF DENVER, COLORADO.

ORE CONCENTRATOR.

Application filed February 13, 1923. Serial No. 618,821.

To all whom it may concern:

Be it known that I, WILLIAM A. BUTCHART, 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 Ore Concentrators, of which the following is a specification.

My invention relates to improvements in concentrators of the type in which a laterally inclined, lengthwise riffled deck or table, mounted for longitudinal reciprocation, is actuated by a suitable mechanism connected at an end thereof.

In the operation of a concentrator of this character, the material and dressing water are fed onto its riffled surface at the upper longitudinal edge and flow transversely of the riffles toward the opposite edge of the surface, where the tailings are discharged. The values in the material, being of greater specific gravity than the sands, tend to fall through the pulp to the surface of the deck, and are segregated in the bottoms of the spaces between the riffles and gradually moved to the mineral discharge end of the table by the vibratory motion imparted thereto.

During the process of segregation or concentration, some particles of rock, sand or other extraneous matter of less specific gravity than the minerals, especially in the threatment of coarsely ground ores, are frequently carried with the concentrates too far toward the minerals discharge end of the deck and it is the object of the present invention to provide a simple and effective method of separating such remaining particles of non-metallic matter from the mineral concentrates before the latter reach the discharge end of the deck.

I attain this object by forming, adjacent the concentrates discharge end of the deck, a channel which extends diagonally of its surface.

When the concentrated values enter the diagonal channel, the forward movement of the accompanying rock particles is restrained by the current of liquid flowing in the channel and by the sloping sides thereof, and said rock particles are retained in and passed downward along the channel to a point at or near the lower edge of the deck and are there discharged into middlings or waste. The minerals, by reason of their greater specific gravity, are able to cross the channel and continue their movement lengthwise of the riffles to the concentrate discharge end of the deck.

An embodiment of my invention thus briefly explained, has been illustrated in the accompanying drawings in the several views of which like parts are similarly designated and in which—

Figure 1 represents a perspective view of the improved concentrator;

Figure 2, a plan view of the riffled deck of the same;

Figure 3, a fragmentary section transversely of the diagonal channel taken on the line 3—3, Figure 1, and drawn to a much enlarged scale; and

Figure 4, a similar section showing a modification in the construction of the channel.

Referring to the drawings, the reference numeral 2 designates the deck or table of the concentrator, suitably supported for longitudinal reciprocation upon a base structure 3.

The material under treatment is fed onto the surface of the transversely inclined table from a feed box 4 at the upper edge thereof, and dressing water is supplied through a distributor 5 extending between the feed box and the foot-end of the table.

A mechanism 6 of suitable construction connected with a conveniently located source of mechanical energy, is connected at the head-end of the table to produce the longitudinal vibratory motion by which the concentrates are caused to move along the spaces between the riffles, in which they are segregated.

The surface of the table is covered with linoleum or other similar material as shown at 7 in Figures 3 and 4, and fastened upon this covering are the longitudinally extending parallel riffles 8.

Extending diagonally across the riffled surface adjacent the concentrates discharge end of the deck, is the channel 9 constituting the present improvement, which in the preferred construction illustrated in the drawing, is formed by grooving the wooden body portion of the table and depressing the linoleum into the groove.

The concentrating surface of the table is first brought to a perfect plane by carefully dressing the boards of which it is built, the groove or channel being then cut to the desired depth and width upon such diagonal

or other line as may be most suitable for the proper treatment of the ore. It is preferable that the concentrating surfaces on each side of the groove or channel be in the same plane, or parallel with each other in every direction.

The concentrating surface is usually about 6 ft. wide by 15 ft. long. The channel or groove is preferably from 2″ to 4″ wide and from ⅛″ to ½″ deep. It may be of the same width and depth throughout its length, but may be made deeper or wider at one end that at the other. It may, for instance, be ⅜″ deep and 4″ wide at the upper end which receives the larger portion of the concentrates, and $\frac{1}{16}$″ or less in depth by 2″ in width at its lower or discharge end. Such changes in dimensions are governed by the amount of mineral to be removed as concentrate, the coarseness to which the ore is ground, and the tonnage which the table is to treat.

The groove or channel having been cut in the concentrating surface, the linoleum or other covering is laid in place and pressed down into the groove to accurately follow its contour. In case the deck is to be covered with concrete in place of linoleum, a form may be used to accurately mould the groove although this is not necessary.

The riffles may be terminated at opposite sides of the channel by interrupting their continuity as shown in Figure 3, or they may be made continuous as in the ordinary construction and formed to extend across the groove in constant contact with its bottom surface as illustrated in Figure 4.

While the first mentioned form is preferred since it provides an unobstructed channel for the removal of the extraneous matter separated from the concentrates, the other form is advantageous under conditions tending to oppose a continuation of the movement of the values through the spaces between the riffles.

In the form shown in Figure 3, the portions of the riffles at the side of the diagonal channel adjacent the discharge-end of the table, are slopingly extended into the channel for the purpose of facilitating the transverse movement of the concentrates.

In the operation of my improved concentrator, the material delivered at the upper edge of the deck flows across its laterally sloping riffled surface, the lighter gangue passing over the riffles and discharging at the lower edge of the deck, while the mineral values are retained in the spaces between the riffles and moved to the mineral discharge end of the deck by its vibratory differential motion.

The concentrates segregated from the gangue in the spaces between the riffles frequently carry particles of rock, sand or other foreign matter which owing to their size, their formation or their constitution, fail to follow the flow of the tailings across the riffles, and when the segregated mineral enters the diagonal channel, these accompanying lighter foreign particles are caught in the current of liquid flowing through the same and continue in the channel to the lower edge of the table, while the minerals are gradually carried out of the channel onto the surface of the table and continue their movement between the riffles to the concentrates discharge end of the same.

Having thus described my improved concentrator, I desire it understood that other methods of forming the diagonal channel in the riffled surface thereof, besides those shown in the drawings and hereinabove explained, may be availed of within the spirit of my invention as defined in the hereunto appended claims.

It is not positively essential that the channel should discharge in the tailing discharge edge of the table since it is possible to terminate it in the surface of the deck adjacent said edge or in or near the mineral discharge end of the same, in which case the matter flowing downwardly through the channel would still be discharged from the deck separate from the concentrates.

What I claim and desire to secure by Letters Patent is:

1. A concentrator comprising a table having a transversely inclined, riffled concentrating surface, and means for causing a movement of concentrates between the riffles to a discharge-end of the same, the table having a channel extending transversely of its riffled surface.

2. A concentrator comprising a table having a transversely inclined, riffled concentrating surface, and means for causing a movement of concentrates between the riffles to a discharge end of the same, the table having a channel extending diagonally of its riffled surface.

3. A concentrator comprising a table having a transversely inclined riffled concentrating surface, and means for causing a movement of concentrates between the riffles thereon to a discharge end of the same, the table being provided with a groove extending diagonally of its riffled surface.

4. A concentrator comprising a table having a transversely inclined riffled concentrating surface, and means for causing a movement of concentrates between the riffles thereon to a discharge end of the same, the table being provided adjacent its concentrate discharge end with a channel extending diagonally of its riffled surface.

5. A concentrator comprising a table having a transversely inclined riffled concentrating surface, and means for causing a movement of concentrates between the riffles to a discharge end of the same, the table be-

ing provided with a channel extending diagonally of its riffled surface, and the continuity of the riffles being interrupted in said channel.

6. A concentrator comprising a table having a transversely inclined riffled concentrating surface, and means for causing a movement of concentrates between the riffles of the table to a discharge end of the same, the table being provided with a groove extending diagonally of its riffled surface and the bottom of the groove sloping upwardly to the concentrating surface in the direction of the discharge end of the table.

7. As a new article of manufacture, a concentrating table having a longitudinally riffled transversely inclined surface and provided with a channel extending transversely of said surface.

8. As a new article of manufacture, a concentrating table having a longitudinally riffled transversely inclined surface and provided with a channel extending diagonally of said surface.

9. A concentrating table having a transversely inclined, longitudinally riffled and diagonally channeled surface, and means for causing a movement of concentrates between the riffles to a discharge-end of the same.

In testimony whereof I have affixed my signature.

WILLIAM A. BUTCHART.