W. A. BUTCHART.

CONCENTRATOR.

APPLICATION FILED MAY 14, 1912.

1,052,036.

Patented Feb. 4, 1913.

Fig. 1.

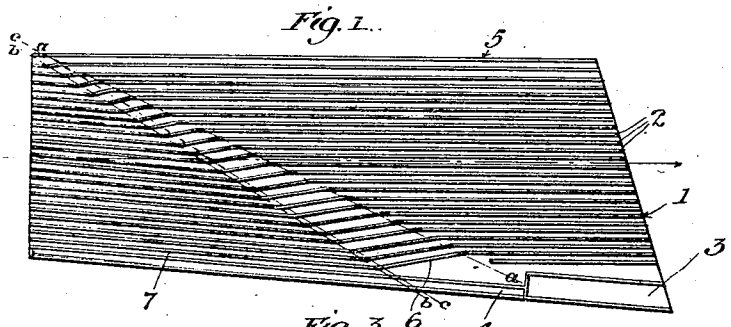


Fig. 3.

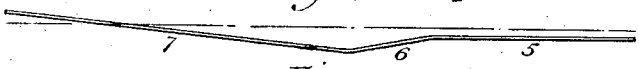


Fig. 4.

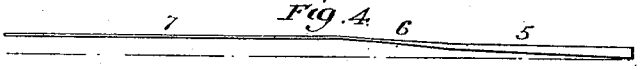


Fig. 7

Fig. 5.

Fig. 6.

Fig. 2.

Fig. 10.

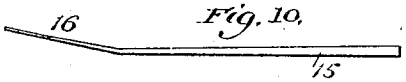


Fig. 9.

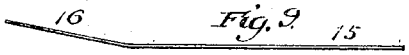


Fig. 11.

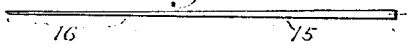
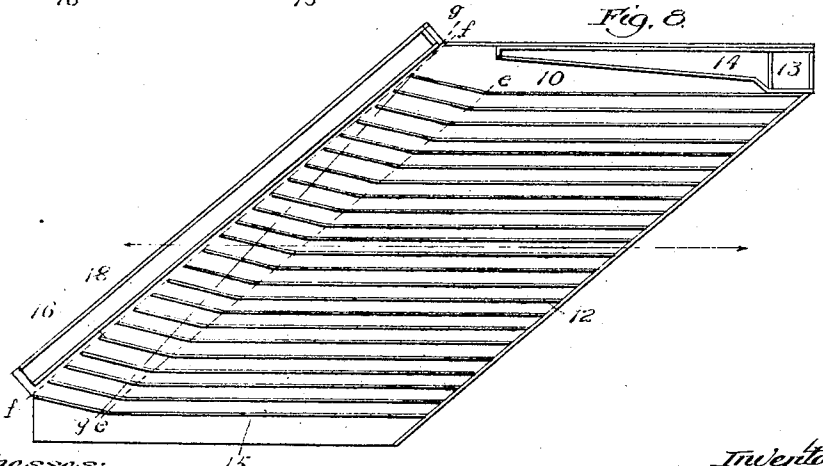


Fig. 8.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM A. BUTCHART, OF LOS ANGELES, CALIFORNIA.

CONCENTRATOR.

1,052,036. Specification of Letters Patent. Patented Feb. 4, 1913.

Application filed May 14, 1912. Serial No. 697,317.

To all whom it may concern:

Be it known that I, WILLIAM A. BUTCHART, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Concentrator, of which the following is a specification.

This invention relates to improvements on the concentrator table disclosed in my Patents Nos. 997,235 issued July 4th, 1911, and 1,000,579 issued August 15th, 1911, and the main object of the present invention is to improve the method of placing the riffles upon the surface of a concentrator table as set forth in said applications, so that such table may be enabled to treat a greater daily tonnage of material, especially ores carrying high mineral values, under the varying conditions of treatment as found in different localities.

In order that the loss of values may be reduced to a minimum in concentrating different classes and grades of ore carrying values in one metal, as well as complex ores whose values are in two or more metals, and to provide means for their more economical and advantageous extraction, I have in some cases found it desirable to vary the systems of riffling disclosed in the patents mentioned, and also to modify said systems in such manner that they may be accommodated to table surfaces of other forms than those shown in my patents.

Other objects of the invention will appear hereinafter.

The accompanying drawings illustrate embodiments of the invention, and referring thereto: Figure 1 is a plan of one form of the table. Fig. 2 is an end elevation thereof. Fig. 3 is a plan of one of the riffles shown in Fig. 1. Fig. 4 is a contour of said riffle. Fig. 5 is a side elevation of said riffle. Figs. 6 and 7 are end elevations of the riffle shown in Fig. 5. Fig. 8 is a plan of another form of table embodying my invention. Fig. 9 is a plan, Fig. 10 is a contour, and Fig. 11 is a side elevation of one of the riffles shown in Fig. 7.

1 designates a concentrator table surface provided with riffles 2, extending longitudinally thereon, with a feed box 3 toward the rear end and at the side which, in the operation of the machine, is the higher side thereof, and with a water box 4 for supplying dressing water. Suitable means are provided for supporting the table, imparting motion thereto, and giving it longitudinal and transverse inclinations, but are not shown as they form no part of this application. Each of the riffles of my system comprises a rear portion 5 extending from the rear or feed end of the table toward the front or concentrates discharge extremity thereof, approximately parallel to the line of reciprocation indicated at *x*—*x* in Figs. 1, 3 and 4, these rear riffle portions 5 terminating along a line *a*—*a*, extending diagonally toward the lower side and front end of the table, so that the termination of each riffle portion 5 is somewhat in advance of the preceding riffle portion 5. Each riffle further comprises a portion 6 extending forwardly from the end of the riffle portion 5 and deflected with reference to said riffle portion 5 toward the upper side of the table. These riffle portions 6 may terminate along a second line *b*—*b*, extending diagonally toward the lower side and front end of the table. The riffles may further comprise delivery portions 7 extending from the upwardly deflected portions 6 aforesaid, forwardly along the table, being, for example, deflected with reference to said riffle portions 6, toward the lower side of the table. The rear part of the table occupied by the riffle portion 5 constitutes a stratifying zone, the part occupied by the riffle portions 6 constitutes a cleaning zone, and the part occupied by riffle portion 7 constitutes a delivery zone, the space between any two successive riffles 2 therefore constituting a complete concentrating surface.

In order to secure maximum capacity it is desirable to taper and gradually diminish the height of those portions of the riffles in which the stratification is effected, viz., the portions 5. I have found that the best results are obtained by extending the taper or gradual decrease in height of the rear portions 5 of the riffle portions 6 in the cleaning zone, for example, by providing a gradual decrease in height of the riffles to a point which is in advance of the beginning of the deflected portions 6, so that more or less of said deflected portions 6 are also tapered. Thus, as indicated in Fig. 1, the taper of the riffles may terminate along a diagonal line *c*, *c*, extending obliquely from the forward end of the uppermost riffle portions 6 to the rear end of the lowermost riffle portions 6 so that the taper extends to a greater distance along the upper riffle portions 6 than it does along

the lower riffle portions 6 and in the intermediate riffle portions 6 the taper will end at a point such as indicated at *d* in Fig. 5, intermediate the ends of the riffle portions 6.

The advantage of having the taper of the riffle extending beyond the beginning of the deflected portions 6 is that the separation is thereby rendered cleaner and the capacity is increased, as the machine may be loaded to a greater extent without danger of piling or crowding of the heavy material over the riffle portions 6 in the cleaning zone where it first strikes the obstruction due to the upward deflection of said riffle.

The operation is as follows: The table being reciprocated in the usual or any suitable manner, for example, by differential head motion, and the material being fed thereonto from the feed box 3 and water being supplied from the water box 4, the material is supplied over the stratifying zone, accumulating in the spaces between the riffles and being caused to advance along the table by the differential motion, at the same time the water passing transversely over the table, causes progress of the material, particularly of the lighter constituents, from the higher toward the lower side of the table, and by reason of the shaking action, the materials settle in strata according to their density. As the stratified material is forced forwardly by the differential motion, it enters the cleaning zone between the diagonal lines *a*—*a* and *b*—*b*, and is deflected upwardly by the riffle portions 6 and is subjected in such zone to the cleaning action of the water which is passing downwardly between the riffle portions 6 in a direction opposite to that of the solid material. By reason of the taper of the initial portions of these cleaning riffle portions, the material is subjected to a gradual wash or overflow of the lighter material over these taper portions and a more uniform cleaning action secured. On reaching the upper ends of the deflected riffle portions, the material enters the spaces between the riffle portions 7 in the delivery zone and passes longitudinally in said spaces to the discharge or front end of the machine.

The invention may be applied as shown in Fig. 8, in connection with a table in which there is no delivery zone, the material being delivered directly from the cleaning zone to the discharge extremity of the table. In this figure, 10 represents the table surface, 12 the riffles thereon, 13 the feed box and 14 the water box, the table being inclined so that the feed and wash water boxes are at the higher end. In this case the riffles 12 may be provided with rear portions 15 extending parallel or approximately parallel to the axis of reciprocation of the table indicated at *x*—*x* in Fig. 8, and cleaning riffle portions 16 extending from the ends of said rear riffle portions and deflected upwardly toward the higher side of the table. The riffle portions 16 may begin on a line *e*—*e*, and terminate on a line *f*, *f*, said lines extending obliquely or diagonally toward the lower side and delivery end of the table. The riffles 12 may in this case be tapered continuously from their rear ends to a point beyond the beginning of the deflected riffle portions 16, for example, terminating on a diagonal line indicated at *g*, *g*, so that the taper extends farther along in case of the upper riffles than in the case of the lower riffles. The riffle portion 16 may terminate at the discharge edge of the table, the concentrates being delivered directly into a launder 18.

While I have found the constructions above described to be most effective in practice, my invention is not limited thereto, but may be embodied in any form of table operating on the same principle, and embodying as an essential feature, the gradual decrease in height of the riffles in the cleaning zone, or a portion thereof.

What I claim is:

1. A reciprocating concentrating table having a plane surface, one side of said table being higher than the other, riffles upon said table comprising rear portions parallel to the line of reciprocation of said table, and riffle portions extending from said rear riffle portions and deflected obliquely toward the higher side of the table and at an angle to said line of said reciprocation, the initial and final ends of said deflected portions being advanced beyond the corresponding points of the preceding riffle and said riffles tapering in height from their rear ends forwardly, the taper in height of said riffles extending throughout the rear riffle portions aforesaid and the initial portions of said deflected portions of the riffles.

2. A reciprocating concentrating table having a plane surface, one side of said table being higher than the other, riffles upon said table comprising rear portions parallel to the line of reciprocation of said table, and riffle portions extending from said rear riffle portions and deflected obliquely toward the higher side of the table and at an angle to said line of said reciprocation, the initial and final ends of said deflected portions being advanced beyond the corresponding points of the preceding riffle and said riffles decreasing in height from their rear ends forwardly, the decrease in height of said riffles extending beyond the beginning of said deflected portions of the riffles, and terminating intermediate the ends of said deflected portions of the riffles.

3. A reciprocating concentrating table having a plane surface, one side of said table being higher than the other, riffles upon said table comprising rear portions

parallel to the line of reciprocation of said table, and riffle portions extending from said rear riffle portions and deflected obliquely toward the higher side of the table and at an angle to said line of said reciprocation, the initial and final ends of said deflected portions being advanced beyond the corresponding points of the preceding riffle and said riffles decreasing in height from their rear ends forwardly, the decrease in height of said riffles terminating intermediate the ends of said deflected portions of the riffles, and front portions beginning at the ends of said deflected riffle portions, said front riffle portions being deflected toward the lower side of the table.

In testimony whereof, I have hereunto set my hand at Los Angeles, California this 3rd day of May, 1912.

WILLIAM A. BUTCHART.

In presence of—
ARTHUR P. KNIGHT,
MARTHA M. LANGE.