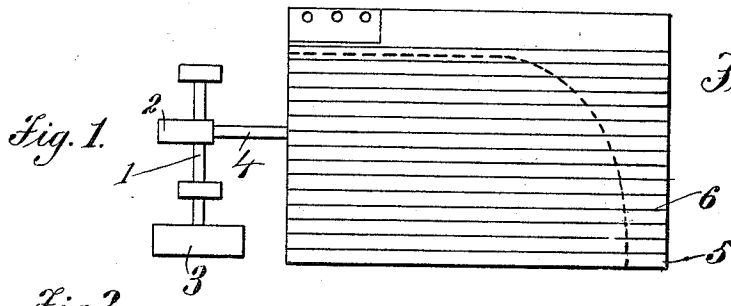
R. T. SCHRAUBSTADTER.

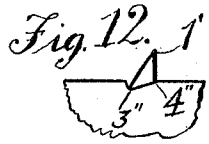
CONCENTRATOR TABLE.

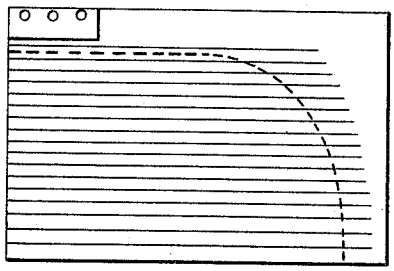
APPLICATION FILED APR. 3, 1908.

**1,006,293.** **Patented Oct. 17, 1911.**

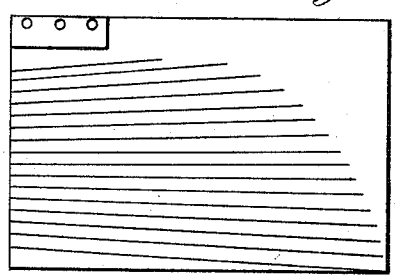
2 SHEETS—SHEET 1.





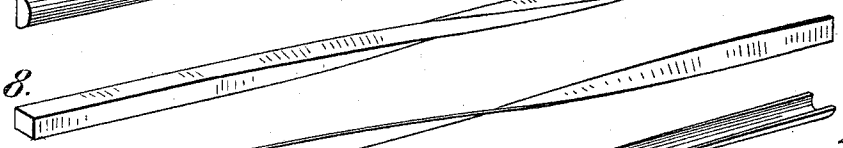














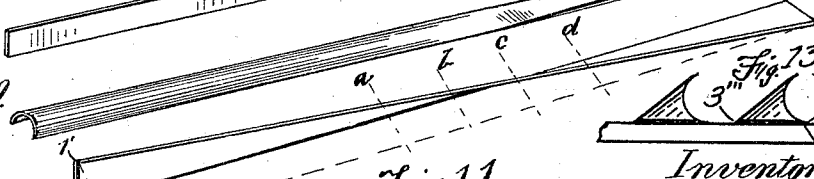



Fig. 11

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2 SHEETS—SHEET 2.

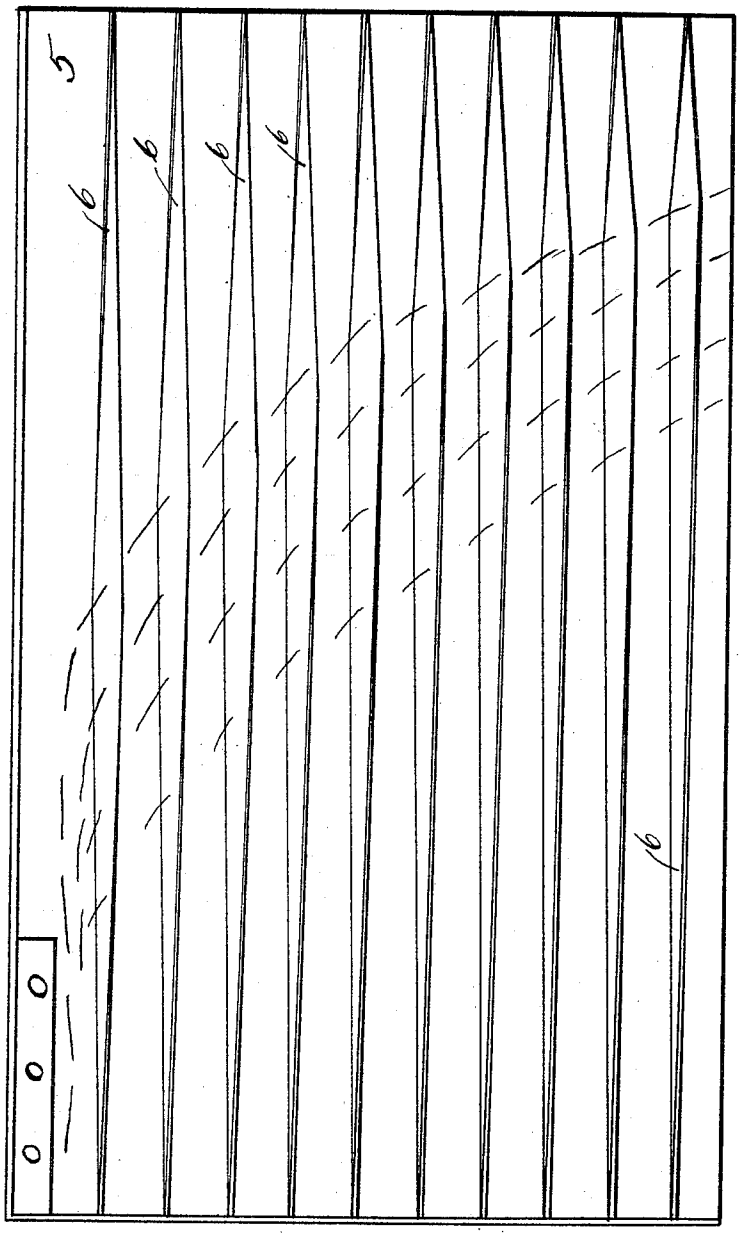


Fig. 14.

Witnesses

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# UNITED STATES PATENT OFFICE.

RICHARD T. SCHRAUBSTADTER, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-EIGHTH TO CARLOS P. GRIFFIN, OF SAN FRANCISCO, CALIFORNIA.

## CONCENTRATOR-TABLE.

1,006,293. Specification of Letters Patent. Patented Oct. 17, 1911.

Application filed April 3, 1908. Serial No. 425,034.

*To all whom it may concern:*

Be it known that I, RICHARD T. SCHRAUBSTADTER, a citizen of the United States, residing at St. Louis, State of Missouri, have invented a new and useful Concentrator-Table, of which the following is a specification in such full and clear terms as will enable those skilled in the art to construct and use the same.

This invention relates to a surface for a concentrating table of the end shake type and the object is to produce a table surface that will spread the mass of concentrates and the mass of gangue and slime as far apart as possible thus making the separation as complete as possible, and allowing the use of the proper amount of water without danger of flooding the concentrates over into the zone of the gangue material.

Another object of the invention is to make a table that will have its riffle surfaces tangent to the table surface at some point, or if not tangent parallel with the same at some point, the object being to make possible the utilization of a larger area of the table than is possible where the ordinary straight, or wedge shaped riffles are used, while at the same time making it possible to cause the spread of the material over the table in a more efficient manner, and to make it possible to use a riffle of the full length of the table which will permit the materials to concentrate perfectly, and at the same time insure the retention of any heavy materials above any riffle that may happen to catch them, and at the same time allowing the water supply to move across the table so as to wash the gangue materials completely, and efficiently.

In the drawings, in which the same numeral of reference is applied to the same parts throughout, Figure 1 is a plan view of a plane table showing the main path of the water over the table, Fig. 2 is a view of a table showing the riffles applied to it, the upper series of riffles running uphill and the lower series running downhill, due to the fact that a "warped" vessel is used, Fig. 3 is an end view of the warped table, Fig. 4 is a side view of the warped table, Fig. 5 is a plan view of a plane table in which the riffles are spread out in the shape of a fan, Fig. 6 is a perspective view of a wedge shaped riffle twisted, Fig. 7 is a perspective view of a semicircular riffle twisted, Fig. 8 is a perspective view of a square riffle twisted to give the warped surfaces, the angle of twist being 180 degrees, Fig. 9 represents a riffle that has only a differential thickness, as where a thin sheet of metal or hard rubber might be used, Fig. 10 is a view of a riffle made of sheet material which has been pressed into a convex shape at one end and an opposite concave shape at the other end, Fig. 11 shows a view of a flat riffle turned only 90 degrees, Fig. 12 is an elevation of one end of a table having a warped riffle applied to it, the riffle being depressed below the general surface of the table at the discharge end thereof, and Fig. 13 is an end view of a portion of a table showing two riffles and looking from the tail end of the table, and Fig. 14 is a plan view of a table top showing the appearance of the riffle shown in Fig. 9, the flow of the greatest amount of water being indicated by the dotted lines.

In Fig. 1 the numeral 1 represents the driving shaft, 2 the driving eccentric, and 3 the driving pulley. The shaft is connected with the table by means of the pitman 4, and the table is supported by any suitable means, the means for supporting the table being no part of this invention. The table is shown at 5 and may be of the plane form provided with the riffles 6, which extend from end to end thereof.

In Figs. 2, 3 and 4 are shown views of a warped table the riffles running only a portion of the distance from the head to the foot of the table, and Fig. 5 is a plan of a plane table in which the riffles are spread out in the shape of a fan, the riffles terminating short of the end of the table.

In all the above figures the riffles are so small that they do not show their true form the remaining figures of the drawings being for the purpose of showing the detail construction of each riffle, any one of the various types being used indifferently to accomplish the desired result.

In order to spread the material out over a concentrating surface it is desirable to use riffles of some kind, but if the riffles are made to extend throughout the length of the table, the tendency is to cause too large an amount of the water used to pass over the end of the table instead of passing over the mass of material on the table to separate the same. To overcome this difficulty I

make the riffles used on the table axially twisted as shown in Figs. 6 to 10, the place at which the water will pass over the table being determined by the amount of the twist given the individual riffles. The particular cross section of the riffle makes little difference for the reason that when the riffle is twisted it presents to the material being concentrated a warped plane that is of varying inclination throughout its length.

In Fig. 6 is shown the common form of wedge shaped riffle which has a warped surface on its upper side, the riffle being twisted downward at the tail end of the table through an angle of 180 degrees, the amount of the twist at any point being such as to give the desired distribution of the materials on the table, as for example, supposing this form of riffle to be used in Fig. 1 the wedge might be twisted so that it would have the full 180 degree turn along the dotted line of that figure, thus causing the planes presented to the material above each riffle to be flatter as the lower edge of the table is reached, but the place at which the water would run over would be determined by the place at which the complete 180 degree twist is made.

In Fig. 7 is shown another form of riffle, one side being plane and the other semicircular. In the same way this riffle is shown twisted through an angle of 180 degrees, but in this case the plane at the feed end of the table is shown vertical, and as the twist is followed out it becomes flatter and flatter till at the dotted lines of the table shown in Fig. 1 the plane surface would be parallel to the plane of the table and the thickness of the radius of the riffle above the same, thus determining the path of the largest quantity of water flowing over the table. As the dotted line is crossed the riffle is turned still farther and it then presents a holding surface to the materials collected above the riffles, while at the same time allowing the water to flow over the riffles toward the mass of material on the table, since the greatest mass of material is the gangue and not the concentrates and the gangue must have an excess of water to keep it in motion properly.

In Fig. 8 is shown a square riffle that has been twisted through an angle of 180 degrees in its entire length which may be used when desired.

In Fig. 9 is shown a riffle made of a sheet of thin material as thin galvanized iron, or thin hard rubber, the means for securing the riffle to the table being omitted. The advantage of this form of riffle is that it gives a riffle surface that becomes practically tangent to the surface of the table at any point that may be desired, and the riffles are continuous throughout the length of the table. With this form, as with the other forms the twist may be so made as to make the material travel in any desired path over the table, the object being to cause the material to travel in a curved path to obtain the largest area of separation surface that is possible for the given table.

In Fig. 10 is shown another form of riffle which is made of sheet material, the head end of the riffle being convex upwardly, the convex portion gradually tapering out till at the dotted lines of Fig. 1 the strip of material has become flat, and then the curve is reversed, the tail end of the riffle being concave upwardly.

It will be observed that in each case the result is that the surface produced by joining the topmost parts of the riffles all over the table would give a warped surface, similar to the warped surface shown in my Patent 738,493, Sept. 8, 1903, and on which this is an improvement for the reason that the same effect may be obtained at much less expense, because it is not essential to utilize a warped table to obtain the desired results. With this form of riffle the warped concentration surface may be obtained on a plane table by the simple placing of the riffles twisted as described.

The warped riffles may be used on the warped table shown in Figs. 2, 3 and 4, if desired, or they may be used on a plane table as shown in Fig. 5. In the case of the warped table the efficiency of the warped riffle is increased for the reason that combined with the uniformly variable surface produced by the tops of the riffles is a uniformly variable under surface on which the riffles are placed. Because of the fact that both the surfaces, *i. e.* the table surface and the surface produced by passing a flexible sheet over and in contact with the tops of all the riffles do not intersect no ripples in the passing pulp are produced. The object of producing this uniformity of surface is to produce a like uniformity of concentration when the table is at work. It will be noted that in the common form of concentrating table that complex intersecting planes are produced, as for example the table having a plane under surface and a series of tapering riffles. The so-called "roughing plane" over the tops of the riffles intersects the table plane at a point near the ends of the riffles, thus causing ripples in the water passing over the table and interfering with the concentrating effect along the line of the termination of the riffles. The formation of riffles in this trough at the termination of the riffles is entirely avoided with the table shown in this application for the reason that at no point in the table surface is there any intersection of the roughing plane with the table surface, the nearest to intersection being a tangency of the roughing plane with the plane of the table on which the riffles

are secured. The effect of this is that there is a differential change over the entire table surface. It will also be observed that in the forms of the riffle shown in Figs. 7 to 10 the riffles increase in height from a point near their central portions to the tail end, thus making it possible to prevent the escape of water in the direction of the length of the riffle and throwing it back toward the center of the table where it will pass over the body of the material being concentrated.

In Fig. 11 is shown a thin strip of material, such for example as is described in connection with Fig. 9. Now if the feed end of the riffle be secured in a vertical position as shown at 1′ and 2′, the edge 2′, 4′ being then held down on the table, and the corner 3′ also held down on the table on the lower side, an effect similar to that of Fig. 9 will be produced, but with the difference that there is no subsequent raising of the riffle as occurs with the riffle shown in Fig. 9. This will produce a warped surface on the upper side of the riffle and over which the body of the material being concentrated must pass. It will be clear that by bending the riffle, say at the point marked *a*, down more than at the point marked *b* that the concentrating material will be able to pass over the riffle sooner than it would in the second case, and in this way the entire series of riffles may be bent to give the proper distribution of water and ore. That is the riffles on the upper edge of the table will be bent well down close to the feed box, say at *a*, the next riffles will be bent nearly flat at *b*, the next lower riffles will be bent nearly flat at *c*, the next lower series will be bent nearly flat at *d* and so on through the entire series, thus giving the curved path shown in the first figure. It will be clear in any instance that the riffles may extend to the end of the table or not as desired, and it will also be clear that the warped surface might be produced by filling the riffle in, as shown by the dotted line 3′—5′ and 1′—5′ and 2′—5′, the resulting riffle being produced simply by making the upper edge of the riffle with a warped surface, the material being cut away with a knife, or should the riffle be made of sheet metal it would depend on the pattern that it was cut on whether it would be higher at one point than at another.

The objects of the invention are to give a better classification of the ore and slimes from the time they are placed on the table till they are finally disposed of at the end thereof. A better regulation of the wash water may be obtained, as well as a better distribution over the surface of the table, for the reason that the quantity of water coming with the ore is seldom the right quantity, and more water must be run on the table lower down, and since it is possible with this riffle, the form shown in Figs. 7 to 10 for example, to prevent the water from passing off the end of the table in any considerable quantity, a number of water pipes may be used along the upper edge of the table. A further advantage of this riffle is that it makes it possible to use a much larger area of the table, since the low point of any riffle may be at the point at which the riffle crosses any desired path over which it is desired to flow the largest quantity of water.

It will be understood that in each of the Figs. 6 to 11 that the left hand of the drawing is the head end of the riffle.

In Fig. 12 there is shown the same riffle as is shown in Fig. 11 with the exception that the tail end of the riffle is turned down so that the corner 3″ is below the general level of the surface of the table, the corner 4″ being at the same level as the general surface of the table. This latter construction produces shallow grooves in the surface of the table for such length of the table as may be desired, the groove beginning at the place where the riffle becomes tangent to the surface of the table.

The riffle shown in Fig. 13 is the same as the riffle shown in Fig. 10 with the exception that it is a portion of a cylinder at the head end and is flattened out at the tail end. The numeral 1‴ represents the upper end of the riffle 2‴ the head end in contact with the table, 3‴ the tail end in contact with the table and 4‴ the tail end in contact with the table, the corners 2‴ and 4‴ being at the same place in the figure, since it is an end view of the riffle. The result of this construction is that the effective surface of the riffle is always tangent to the surface of the table, the various cross sections of the riffle changing from a cylindrical shell of small radius at the head end to a flat sheet at the tail end of the table. The point of tangency of the riffle surface will be the line 2‴, 4‴ which is the same as the line 2′, 4′ of Fig. 11. It will be noted that with this form of riffle the roughing plane coincides with the plane of the table for such portion of the length of the riffles as they are depressed below the surface of the body of the table, but this does not result in the formation of the objectionable cross rippling of the concentrating water.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a concentrator, a table, means to reciprocate the table, and riffles carried by the table, the individual riffles having a curved unbroken surface for substantially their whole length with a continuously changing horizontal and vertical variation and acquiring substantially the same slope as the table at a point intermediate their ends.

2. In a concentrator, a table, means to re-

ciprocate the table, and riffles carried by the table, the individual riffles having an unbroken surface with a combined vertical and horizontal variation, each riffle becoming substantially tangent to the surface of the table along a line extending substantially the entire transverse dimension of the group of riffles.

3. A concentrating table, means for vibrating the same, riffles on the surface thereof, said riffles being in the form of axially twisted strips.

4. In a concentrator, a table, means to reciprocate the table, and riffles carried by the table, each riffle having a continuously angularly varying surface, the said varying surface of each riffle becoming tangent to the table at a line across the table.

5. In a concentrator, a table, means to reciprocate the table, and riffles carried by the table the individual riffles having a surface with a vertical and horizontal variation, each riffle becoming tangent to the table at a point intermediate its length, and the points of tangency of the successive riffles being in a line extending transversely through the whole series of riffles.

6. In a concentrator, a table, means to reciprocate the table, and riffles carried thereby each having a surface with a continuous horizontal and vertical variation and becoming substantially tangent to the table top at a point intermediate its ends, the points of tangency being on a diagonal line.

7. In a concentrator, a table, means to reciprocate the table, and axially twisted riffles carried by the table, the individual riffles having continuous horizontal and vertical variations forming a substantially unbroken line of release for the pulp, said riffles extending the length of the table.

In testimony whereof I have set my hand this 27th day of March A. D. 1908, in the presence of the two subscribed witnesses.

RICHARD T. SCHRAUBSTADTER.

Witnesses:
C. P. GRIFFIN,
SID. S. PALMER.