

Dec. 23, 1924.

E. A. SPERRY

1,520,451

CONCENTRATING TABLE

Original Filed Oct. 4, 1919

2 Sheets-Sheet 1

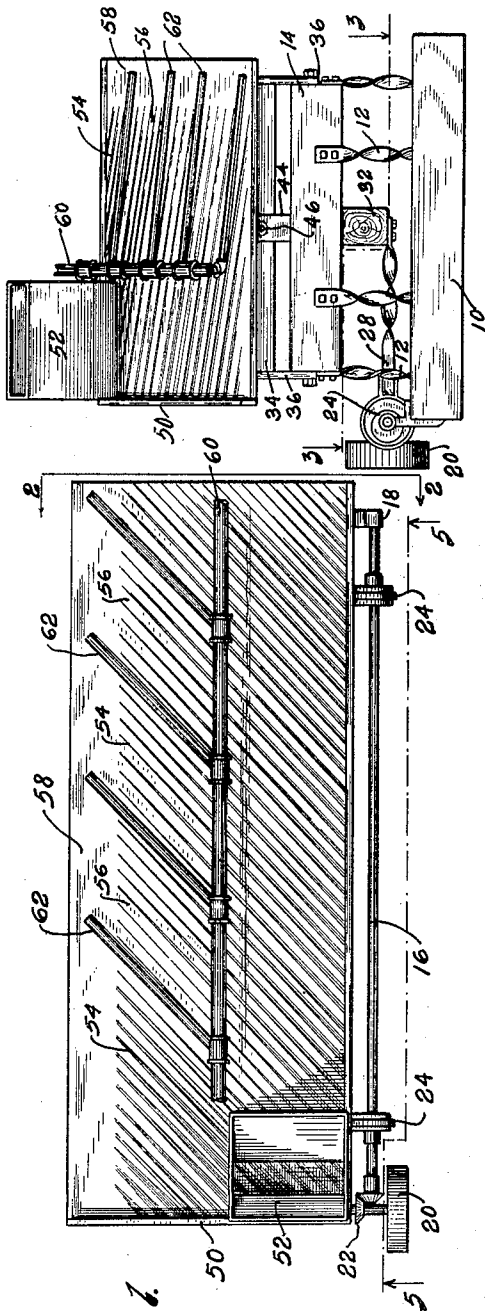


Fig. 1.

Fig. 2

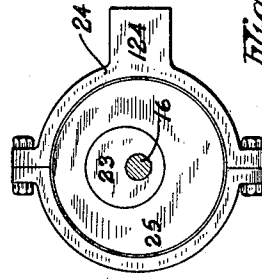
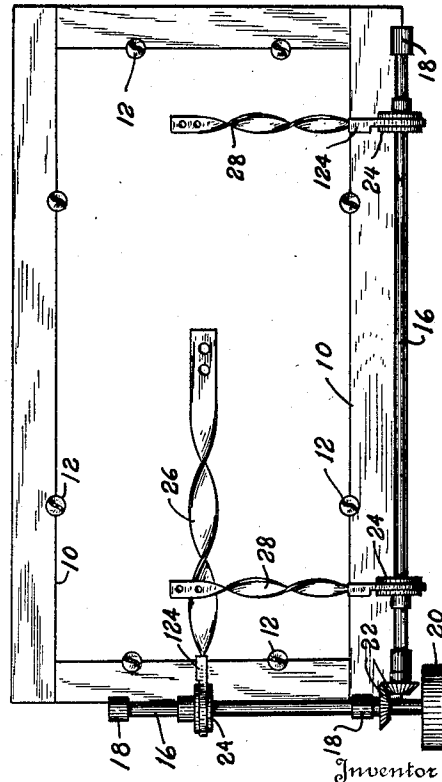


Fig. 4.

Fig. 3.



E. A. Sperry.

By *A. J. Brin*
Attorney.

Dec. 23, 1924.

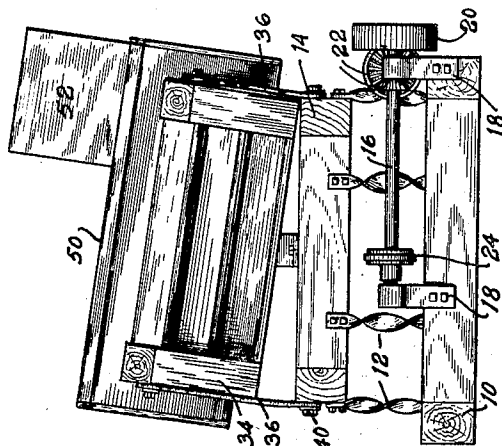
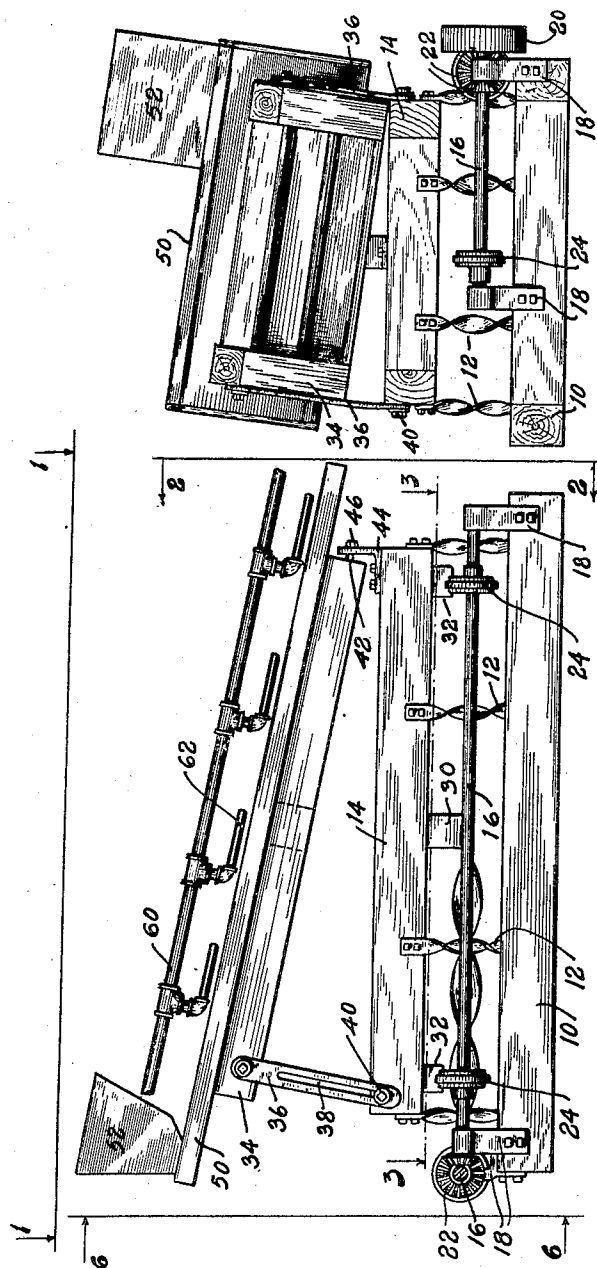
1,520,451

E. A. SPERRY

CONCENTRATING TABLE

Original Filed Oct. 4, 1919

2 Sheets-Sheet 2



Inventor
E. A. Sperry.

By A. J. O'Brien Attorney

UNITED STATES PATENT OFFICE.

EDWIN A. SPERRY, OF TIENTSIN, CHINA.

CONCENTRATING TABLE.

Original application filed October 4, 1919, Serial No. 328,458. Divided and this application filed November 21, 1922. Serial No. 602,349.

To all whom it may concern:

Be it known that I, EDWIN A. SPERRY, a citizen of the United States, residing at Tientsin, China, have invented certain new and useful Improvements in Concentrating Tables; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to a device for concentrating ores, and the object thereof is to provide means which will permit of motion of a concentrating table in any direction in a horizontal plane, and the provision of means to transmit to the table a variety of motions, as may be desired, according to the character of the mineral handled. It is also an object of the invention to quickly classify the values on the table as they pass thereover.

This application is a division of my simultaneously pending application, Serial No. 328,458, filed October 4, 1919.

Briefly, the invention comprises a rigid base above which is mounted a movable or vanning frame, supported by twisted springs of sheet metal or some similar material having sufficient elasticity. The twisted springs readily permit motion in any direction horizontally, but prevent vertical motion. A concentrating table is positioned above the vanning frame, the lower end being mounted at a single central point on the frame and the upper end being connected with the frame by adjustable means for varying the inclination of the table both transversely and longitudinally. The table is provided with grooves extending diagonally from one side, these grooves being relatively wide and deep at said side of the table and gradually decreasing in depth and width until they merge into the surface of the table on a line parallel with the sides thereof. This construction leaves one side of the table plane, and this preferably has a downward slope relatively to the plane of the table proper.

In the drawing:

Fig. 1 is a plan view, indicated by line 1—1 of Fig. 5.

Fig. 2 is an end elevation indicated by lines 2—2, of Figs. 1 and 5.

Fig. 3 is a view taken on the line 3—3 of Fig. 5.

Fig. 4 is an enlarged elevation of one of the eccentrics.

Fig. 5 is a side elevation indicated by line 5—5, of Fig. 1.

Fig. 6 is an end elevation from the line 6—6 of Fig. 5, and showing the end opposite to that of Fig. 2.

The base 10 has a plurality of vertically disposed twisted members 12, formed of sheet spring metal, secured at their lower ends thereto. The upper ends of these springs 12 are secured to the movable vanning frame 14. Two shafts 16 are located along one end and along one side of the base 10, being mounted in brackets 18. One shaft carries a pulley 20 by means of which power is transmitted and bevel gears 22 transmit power to the other shaft. Each shaft carries one, two, or more eccentrics 24, comprising eccentric pieces 23 mounted directly on the shafts, and adjustable eccentric sleeves 25 thereabout, by means of which the stroke or throw of each eccentric may be adjusted. As shown in the drawings, a twisted sheet metal spring 26 is secured to the eccentric 24 at 124, at the end of the machine, and twisted springs 28 are secured to the eccentrics at the side of the machine, these springs 26 and 28 being similar in construction to the springs 12. The inner ends of the springs 26 and 28 are connected to blocks or beams 30 and 32 respectively, which blocks are secured to the under side of the frame 14 whereby motion is transmitted to the frame. The framework 34 of the table is supported by means of straps 36, bolted thereto at the upper ends and provided at their lower ends with slots 38 adjustable upon bolts 40 for determining the inclination of the table. At the opposite end, a pin 42 projects from the framework 34 and passes through an aperture in the bracket 44, the pin being retained if desired by means of a nut 46. This pin 42 is cen-

trally located on the lower end of the framework 34, thereby providing three points of support for the table in connection with the two adjustable straps 36. By this construction the table may be inclined to any desired angle, both longitudinally and transversely.

The framework 34 carries a table 50, and may be provided as shown at one end with a feed hopper 52. The surface of the table is provided with a plurality of riffle grooves 54, which extend from one side of the machine diagonally across toward the other side, terminating on a line indicated at 56. These grooves opposite the line 56 are relatively deep and wide. As they extend towards the opposite side, they become gradually narrower and more shallow, until they merge into the table top at the line 56. This leaves a narrow, smooth strip 58 parallel with the side of the table, which may be inclined as shown in Fig. 2 relatively to the table proper in order to facilitate discharge of the values. Mounted above the table is a water supply pipe 60, having branches 62 extending approximately parallel with the riffle grooves 54.

In the operation of the device, power applied through pulley 20 is transmitted by the bevel gears 22 to the shafts 16. The relative speeds of the shafts 16 may be governed by changing the relative size of the gears 22. The motion transmitted to the springs 26 and 28 may be varied by adjusting the eccentric sleeves 25. In this manner the stroke of one of the springs may be made longer or shorter than that of the others, and this may be further influenced by giving a variable speed of rotation to the shafts 16. Thus various combinations of these features will enable the operator to produce any motion from a straight, diagonal motion to a circular motion, as may be required for different kinds of ores. It is obvious that, due to the twisted structure of the springs 26 and 28, motion in any direction perpendicular to the axis of the springs may be permitted independently of the thrust of the given spring; but that the thrust transmitted to the spring will be directly transmitted to the framework due to the fact that the length of the spring is constant.

Similarly, motion in any direction in a horizontal plane will be permitted by the springs 12, but vertical motion of the framework 14 will be prevented.

The inclination of the table 50 having been determined by adjusting the straps 36, and the proper motion having been transmitted to the table as above described, pulp is fed thereto from the hopper 52, or from any other suitable source. The riffle grooves 54 produce classification of the mineral as it passes over them, the heavier mineral being worked toward the plain strip 58,

while the gangue is washed over the grooves, as is obvious. The inclination of the plain strip 58 with respect to the body of the table produces a ready discharge of the mineral as soon as it leaves the riffle grooves 54.

Attention is called to the fact that instead of using eccentrics which simply impart a reciprocating movement, differential speed structures may be used, such as are commonly employed with concentrating machines where increasing speed is given during the outward stroke and decreasing speed during the return movement, thus giving the material a forward throw independently of the inclination of the table. By using structures of the last named class in place of the eccentrics 24, the motion of the table would have a tendency to impart travel to the heavy minerals or concentrates in a diagonal direction across the table, or in the general direction of the grooves or riffles 54, independently of the longitudinal or transverse inclination of the table, and it should be understood that such structure is within the scope of my invention.

However, where the eccentrics only are employed, the table should be inclined, in order that the motion imparted thereto may have a tendency to cause the heavy minerals or concentrates to travel in a diagonal direction across the table, or in the general direction of the riffles, and the waste material longitudinally or parallel to the longer sides or edges of the table, which is contemplated by my improved structure.

The longitudinal inclination alone, supplemented by the diagonal riffles or grooves, would be sufficient to cause the mineral values or concentrates to travel in the direction of the riffles. The transverse inclination of the table, however, is toward the longitudinal edge opposite from that toward which the mineral values are traveling, and this transverse inclination is so regulated as to prevent the waste or refuse from traveling in the direction of the minerals and to cause this refuse to travel in the longitudinal direction only. Such transverse inclination is indicated in Figs. 2 and 6.

In operation, the pulp is delivered onto the head or upper end of the table. The longitudinal slope of the table causes the pulp to flow down along the length of the surface in a line parallel to the long sides or edges of the table. As it passes over the diagonal riffles or grooves, the motion of the table causes the heavy minerals or concentrates to settle into the grooves or riffles, and the impoverished pulp to pass on to the lower end of the table. The motion keeps the pulp and the mineral alive, or in other words prevents them from banking or caking down on the table. The riffles, although they do not have so strong a slope as the

straight, longitudinal slope of the table on account of their diagonal position, still have sufficient slope to cause the heavy minerals to follow down in them and to emerge at the lower end of the grooves onto the plane surface. Now, owing to the diagonal motion, as well as the tendency of the diagonal riffles to drag the main flow of the pulp diagonally across the table, the surface must be sloped slightly toward the pulp side of the table, or that at which the riffles are the deepest, in order to force the waste pulp or refuse to flow in lines parallel to the longer sides or edges of the table and to keep it away from this plane surface onto which the mineral alone should be delivered. As a matter of fact, the transverse slope is used to prevent the flow of the pulp diagonally or transversely on the table. This transverse slope is quite slight, not over one-half inch to the foot at the most, and in an opposite direction to the edge of the table toward which the mineral values are traveling, as heretofore indicated. The straps are adapted to bend to permit the adjustment of the table for transverse inclination.

I claim:

1. Concentrating apparatus comprising a table, means for imparting reciprocating movement thereto in directions at right angles to each other, the table having riffles extending in a direction diagonal to the directions of movement, the table being inclined in both directions of its travel, and means for feeding to the table the material to be treated at a part thereof highest with reference to its inclination in one direction and lowest with reference to its inclination in the other direction.

2. Concentrating apparatus comprising a table having both longitudinal and transverse inclination, means for imparting both longitudinal and transverse reciprocation thereto, and means for feeding material to be treated to a portion of the table highest with reference to its longitudinal inclination and lowest with reference to its transverse inclination.

3. A longitudinally and transversely inclined concentrating table having a diagonally riffled surface, and means for simultaneously imparting both longitudinal and transverse reciprocation thereto to give the mineral values or concentrates a tendency

to travel in the general direction of the riffles, including means for varying the degree of reciprocation in both directions at different points along the end and side of the table.

4. Concentrating apparatus, comprising a table having riffles extending from one side thereof toward the other, means for feeding to the table the pulp to be treated, means for positioning the table to give it both longitudinal and transverse inclination with respect to its length, and to cause the mineral values or concentrates to travel in the general direction of the riffles, and means for simultaneously imparting to the table reciprocating movement in both longitudinal and transverse directions, including means for varying the degree of longitudinal reciprocation at different points along the end of the table.

5. Concentrating apparatus, comprising a table having riffles extending from one side thereof toward the other, means for feeding to the table the pulp to be treated, means for positioning the table to give it both longitudinal and transverse inclination with respect to its length, and to cause the mineral values or concentrates to travel in the general direction of the riffles, and means for simultaneously imparting to the table reciprocating movement in both longitudinal and transverse directions, including means for varying the degree of transverse reciprocation at different points along the side of the table.

6. Concentrating apparatus, comprising a table having riffles extending from one side thereof toward the other, means for feeding to the table the pulp to be treated, means for positioning the table to give it both longitudinal and transverse inclination with respect to its length, and to cause the mineral values or concentrates to travel in the general direction of the riffles, and means for simultaneously imparting to the table reciprocating movement in both longitudinal and transverse directions, including means for varying the degree of both longitudinal and transverse reciprocation, respectively, at different points along the end and side of the table.

In testimony whereof I affix my signature.

EDWIN A. SPERRY.