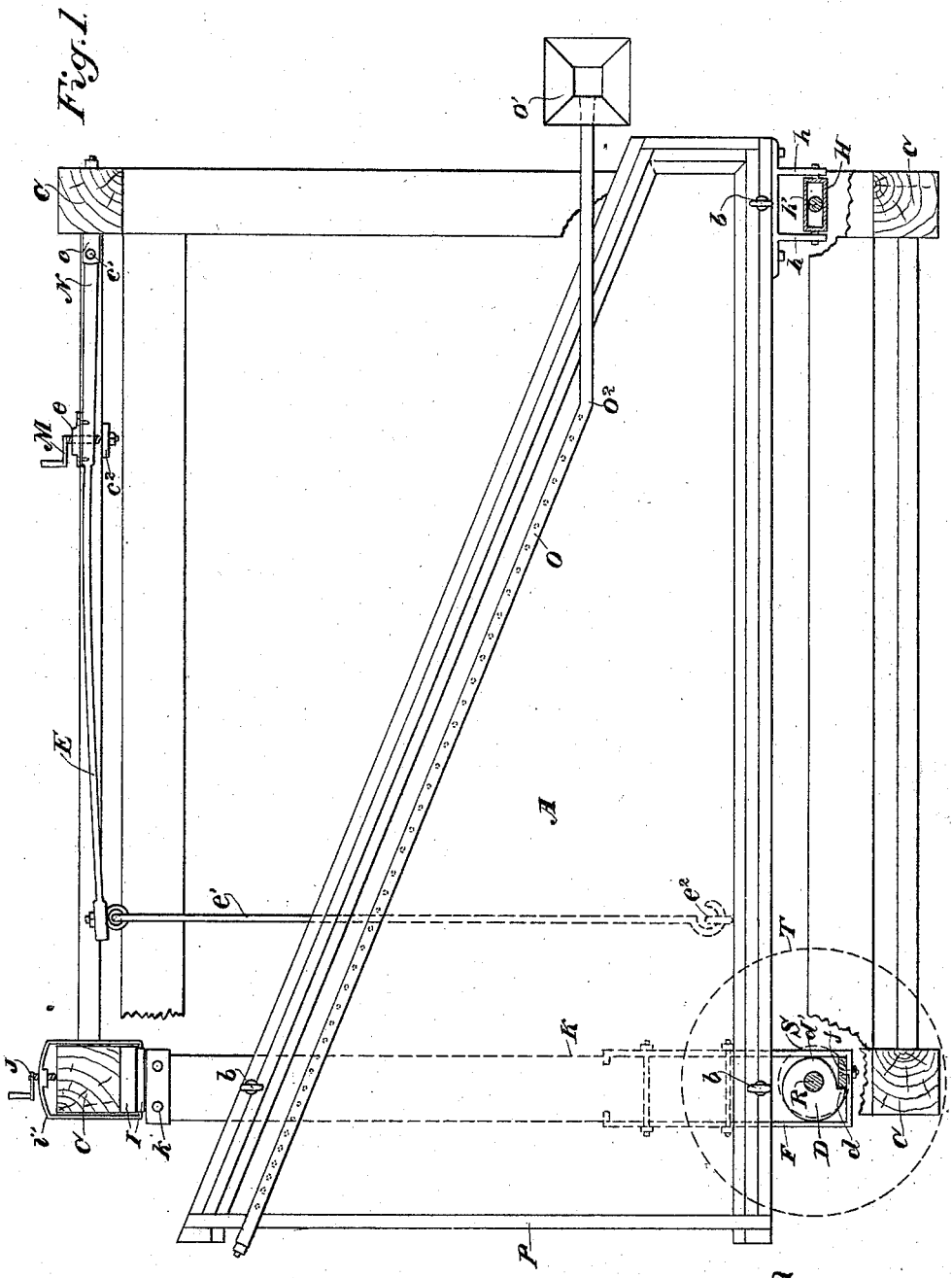
(No Model.) 2 Sheets—Sheet 1.

L. LOOK.

ORE CONCENTRATOR.

No. 526,242. Patented Sept. 18, 1894.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

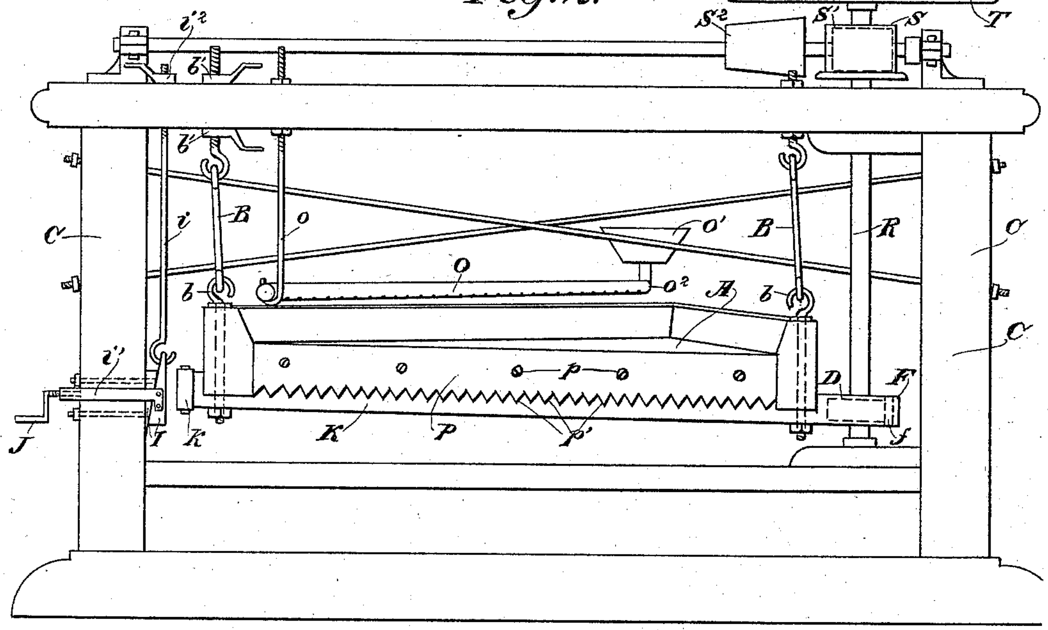


Fig. 3.

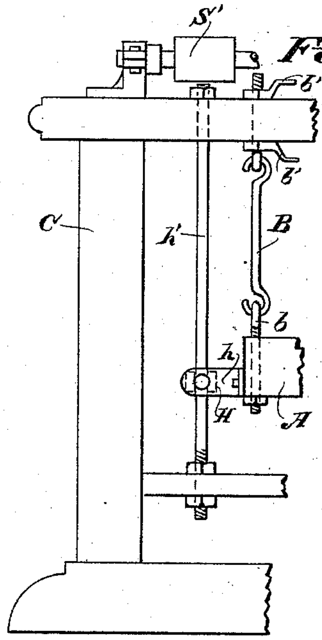


Fig. 4.

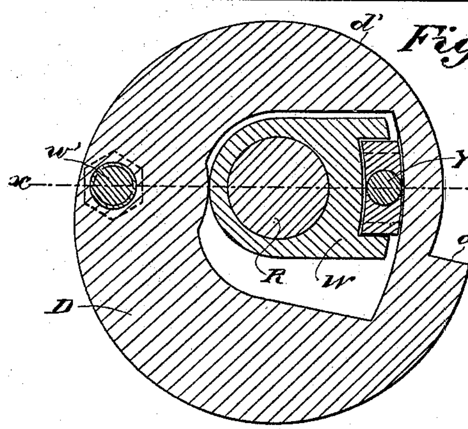


Fig. 5.

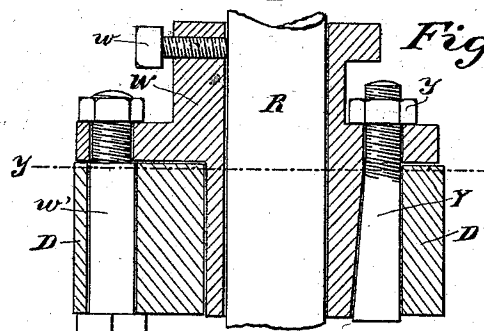
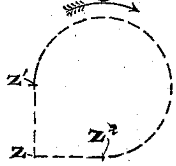


Fig. 6.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

LUTHER LOOK, OF SOLDIER, IDAHO.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 526,242, dated September 18, 1894.

Application filed November 24, 1893. Serial No. 491,880. (No model.)

To all whom it may concern:

Be it known that I, LUTHER LOOK, a citizen of the United States, residing at Soldier, Logan county, State of Idaho, have invented an Improvement in Ore-Concentrators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of concentrators in which eccentric movements are imparted to a table, and especially to that type commonly known as "percussion or bumping tables."

My invention consists of a table having imparted to it, at one end, a circular swinging motion, combined with a side bump, and at the other end a reciprocating end shake or motion.

It also consists in the novel means for imparting said motions and bump and varying them relatively according to the needs of the machine; and it finally consists in the novel details of construction, arrangement and combination relating to the table, and other parts, all of which I shall hereinafter fully describe and specifically claim.

The general object of my invention is to provide by the peculiar motion at the head of the table, for the effective feed of the pulverized ore, thereby increasing the capacity of the machine and improving the quality of the result, and by the swinging motion and the bump at the other end of the table to produce an effective settling action similar to the action of a gold pan, and to draw the mineral to one side as fast as it is settled, the whole resulting in the continuous and automatic discharge of the different classes of concentrates and the tailings.

Referring to the accompanying drawings for a more complete explanation of my invention,—Figure 1 is a top view of my concentrator. Fig. 2 is an elevation of the lower end of same. Fig. 3 is an elevation of one corner of the upper end. Fig. 4 is a horizontal section of the variable eccentric D. Fig. 5 is a vertical section of same on line x—x of Fig. 4. Fig. 6 is a diagram showing the movement of the lower end of the table.

A is the table which, as shown in Fig. 1, is preferably triangular in shape, which form greatly facilitates its successful working at the same time that it economizes material. This table is made preferably of wood, and is covered with suitable material to make a proper concentrating surface. A thin sheet of rubber or of water-proof canvas will serve the purpose, for to these materials the fine mineral particles adhere well. The rubber sheet or waterproof canvas surface also prevents the water from coming in contact with the wooden frame and bottom of the table. The table is suspended from the top part of the frame by means of eye bolts b (Fig. 2) and hanger rods B (Figs. 1, 2 and 3). The table is supported by three of these hangers, as indicated in Fig. 1, one at the upper or head end, and one at each of the two lower corners. The upper eye-bolt b at the head of the table, and also that at the side where the mineral or concentrates are discharged are provided with hand screws or thumb-nuts b' for the purpose of adjusting the incline of the table in the direction of its length, and also laterally, the table being higher at the head or feed end and also at the side where the concentrates are discharged.

C are the corner posts and sill portions of the frame which supports the table A.

D is an adjustable or variable eccentric cam. This cam, in connection with the spring E, produces the different motions of the table. A horizontal section of the eccentric cam is shown in Fig. 4, and a vertical section of same is shown in Fig. 5.

The construction and adjustment of the eccentric cam are as follows: At W (Figs. 4 and 5) is shown a portion of the eccentric cam which is fastened rigidly to the shaft R by means of set screws, as at w in Fig. 5. The top or flange portion is omitted in Fig. 4, for the purpose of showing the lower part of the same. The adjustable portion of the eccentric cam is shown by D. This part is pivoted to the rigid portion by means of the bolt or pin w'. The center of the adjustable part D is cut away, as seen in Fig. 4, to allow it to swing laterally on the rigid portion W between certain limits.

Y shows a tapering key with a set or lock nut y at the top. To adjust the eccentric cam, the nut y and key Y are loosened; the eccentric cam is then swung on the pivot pin w' to the point required, and then the key and nut are tightened to hold them in place.

By these means the eccentric cam may be given any amount of throw required from nothing up to an inch or more. When the notch at d, the center of the key Y, and the center of the pin w' are in line, the eccentric cam has no throw, except that permitted by the tapering notch d, d' while as shown in Fig. 4, it has the full stroke. This eccentric cam is cut away at d, shown in Fig. 4, and the notch gradually tapers to point d', where it runs out and the circle of the eccentric is complete the other three-fourths of the circumference.

At F, Figs. 1 and 2, is shown a box or stirrup in which the eccentric cam revolves and by which motion is given to the table. The eccentric cam revolves freely in this box and has a bearing on three sides at different parts of the revolution, the side toward the table being open as the cam does not touch it at any part of the stroke.

At f (Fig. 1) is a lug or block bolted on the box or stirrup F on the inner side, and this lug is equal in length to one-half the diameter of the eccentric cam, and is as thick as the depth of the notch or offset d in the periphery of the eccentric cam. This box or stirrup F extends under the table and is bolted to the side of the bumping bar K.

E (Fig. 1) is a spring, preferably made of wood which is supported at the end N by two lugs c bolted to the post C of the main frame. Should this spring become bent from use, it can be reversed and used again. A pin c' passes through the lugs c and the end of the spring, and the latter can turn on this pin as a pivot. A hand or crank screw M passes through a nut e fastened to the spring, and the end bears against a lug c^2 fastened to the side of the main frame. By means of a hooked rod e' the spring is attached to the table A and draws laterally from an eye bolt e^2 attached to the under side of the table. As the hand screw M is tightened, the lug or block f on the stirrup F is drawn against the edge of the eccentric cam D at all parts of the stroke, except in the notch d. The bumping bar K, to which the cam stirrup F is bolted, extends across the under side of the table to which it is bolted, and projects beyond the edge of the table, and is bound with an iron band k to prevent it from splitting (Fig. 2).

At I (Figs. 1 and 2) are shown two metal wedges or bumping blocks. These blocks are designed to regulate the length of the lateral bump of the table. The inner one is bolted rigidly to the post C with the thin end of the wedge down; while the outer wedge which is suspended from the top of the frame by a hooked rod i has the thick end down, and has a stirrup or bail i' bolted to the edges and extending around the corner post C. A hand or crank screw J passes through the center of this bail with the point of the screw bearing against the outer or opposite side of the corner post from the wedges. By loosening the hand screw J, and raising the outer wedge I by means of the thumb or wing nut i^2 the outer wedge is forced farther from the post by the inclined slope of the inner wedge, which shortens the lateral bump of the table, when the crank screw is again tightened, which makes the bumping wedges equivalent to a part of the solid post.

At H (Figs. 1 and 3) is a slotted roller supported by two lugs h which are bolted to the side of the oscillating table near the head end. A stout rod h' which is supported at each end by the main frame, passes vertically through the slot in this roller H, and serves as a pivot, and also as a guide for the upper or head end of the table.

At O (Figs. 1 and 2) is shown a perforated pipe which extends along the inclined or sloping side of the table near the edge, and is supported by hangers o from the frame above. It does not touch the oscillating table or come in contact with it at any point. It is designed to supply clear water to that side of the table, when the table is in operation, and may be made in sections for convenience in transportation. It is provided with a funnel o' at the head, to take the water the more readily, and the perforations extend from the point o^2 (Fig. 1) to the lower end of the table.

Fig. 6 shows an outline of the figure produced at the lower end of the table by one revolution of the eccentric cam D. Start at the point Z with the bumping bar K held firmly against the bumping blocks I by the spring E. The notch d on the eccentric cam D has just passed the lug f on the inner side of the cam box or stirrup F. The first quarter of a revolution of the eccentric cam carries the oscillating table to the point Z' on the outline of the figure. During the next three-fourths of the revolution, the outline of the figure produced by the table at and near the eccentric cam, is more or less of a circle, with a diameter equal to the throw of the eccentric. When the notch d on the eccentric cam has come past the lug f on the inner side of the cam box F, the lug is drawn into the notch by the tension of the spring E, and the outline of the figure 6 from Z^2 to Z is completed. Different adjustments will produce different figures. By raising the adjustable bumping block I to its full height, the lug f will be held from dropping into the notch d, and the table will have no side bump, and the figure of revolution will be a half circle, with a diameter equal to the throw of the eccentric. When the eccentric is adjusted to have no throw, and the adjustable bumping block I is lowered to the lowest point, the outline of the figure will be almost a straight line laterally. In other words it will be all side bump and no end shake. The upper or head end of the table is prevented by the slotted roller H and the rod h' from having any lateral or side motion or bump, the motion at this point being an almost straight end shake. The outline of the figure of revolution pro-

duced at different points on the length of the table will be different, being a straight line in the direction of its length at H, and a more or less complete circle at the cam box F. By adjusting the eccentric cam to the center of the shaft, and the bumping block I to the highest point, there will be neither end nor side shake.

At P (Figs. 1 and 2) is shown an apron-board which is designed to hold the rubber or canvas covering of the table securely in place at the lower end. It is held in place by screws *p* and the lower edge extends down below the other parts of the oscillating table, and is notched or serrated along the lower edge, as shown at *p'*. These notches or saw teeth prevent the water and sand or ore from traveling laterally to the lowest side of the table. The upper end of the table is to be provided with a feed hopper with a perforated bottom. This is not shown. This feed hopper distributes the pulverized ore evenly and smoothly over the upper end of the table.

The operation of the machine is as follows—The pulverized ores are fed on to the oscillating table at the upper or narrow end, through the perforated hopper, and are moved down the table by the combined action of the flow of the water due to the incline and the end shake action of the table at this end. As the ores move down, they come more under the influence of the side shake and the side bump. These two motions, combined with the end shake, produce the oscillating or circular swinging motion before described. This oscillating motion loosens up the pulverized ores, and keeps them "alive" which allows the minerals which have greater specific gravity than the quartz, sand, or gangue, to settle through the sand, until they get to the bottom, in contact with the rubber or waterproof covering of the table. The downward motion of the mineral is now retarded, while the effect of the side bump is increased, causing the mineral and sand to move gradually toward the side at which the bump takes place, while moving downwardly; but the mineral moves laterally at a faster rate than the sand, and is drawn from under it, while the sand is held back by the backward and downward action of the water from the jets of the clear water pipe at that side. This action continues on down to the lower end; the bumping action holding the mineral near the side under the jets of clear water, the oscillating action settling the mineral and causing the lighter sand to come to the surface, and the clear water holding the lighter sand and gangue back and moving it down to the lower end of the table. The side of the table at which the bump takes place is raised slightly higher by means of the adjustable hanger at that side, than the opposite side. This causes the clear water from the jets to move downward and laterally in the opposite direction, and assists in holding the sand back. By the time the mineral and sand have reached the lower end of the table, the separation is very complete, so much so that minerals of different specific gravities can be separated from each other. Motion is given to the cam shaft R through the pulleys S, S' and S^2. A fly-wheel is provided at T. Suitable sliding boxes or troughs are to be provided for conveying away the different minerals from the lower end of the machine, and also for carrying away the tailings.

The effect of the serrated edge of apron P may be fully described as follows:—The table being inclined laterally, the mineral particles and the sand travel upwardly toward the bumping side of the table. The mineral particles travel faster and thus separate from the sand; but the down flowing water which should drop off clean and perpendicularly from the lower edge of apron P, would not do so if said edge were smooth, but would cling to and run along down the edge and thus would tend to carry the mineral particles back again to the sand; but by reason of the toothed edge of the apron, the water, and the separated materials all drop off clean and sharp.

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

1. The combination with the freely swinging triangular table or bed provided with suspension devices and having a pivotal longitudinally sliding connection at its head end, of a horizontally turning notched cam at one side of the foot end of the table, a strap or bearing on the table in which said cam works, a bumper at the opposite side of the table from said cam, a spring throwing the table transversely toward the bumper, and against the action of which the cam works, substantially as herein described.

2. The combination with the freely swinging triangular table or bed provided with suspension devices, one or more of which are adjustable to regulate the inclination of the table said table being provided at its head end with a pivotal longitudinally sliding connection preventing lateral sliding at that end, and a shouldered strap or bearing at one side of the opposite end of the said table, of a horizontally turning notched cam in the strap or bearing, a bumper in the path of the table opposite the cam, and a spring throwing the table toward the bumper and against the action of which said cam works, substantially as herein described.

3. The combination with the table and its shouldered strap or bearing, of the operating shaft and a two-part cam thereon, one section of which is rigidly secured to the shaft and the other section of which has a slot or opening receiving said first part, the two sections being pivotally connected beyond the shaft, and means for adjusting the two sections relatively one to the other; the outer section having a circular periphery provided with a notch, whereby by adjusting the said sections

the outer section may be made concentric or eccentric to the said shaft, substantially as herein described.

4. In an ore concentrator, the cam consisting in the outer section D, having a circular periphery provided with a notch $d\,d'$ and with an opening or slot, and the inner relatively stationary section W apertured to receive the shaft, lying within the said slot or opening and pivoted therebeyond to the outer section as at w', and the wedge bolt y, working between the two sections to clamp the outer section D to the section W eccentric or concentric to its shaft opening, substantially as herein described.

5. In an ore concentrator, the swinging substantially triangular inclined concentrating table or bed, in combination with the means for imparting to the foot end thereof a substantially circular motion and a side bump, consisting of the stirrup on one side of the table having a lug within it, the adjustable notched eccentric cam operating within said stirrup, the spring on the other side of the table, or bed, and the adjustable bumper wedges I and bumper bar K on said side, substantially as herein described.

6. In an ore concentrator, the swinging substantially triangular inclined concentrating table or bed, in combination with the means for imparting to the foot end thereof a substantially circular motion and a side bump, consisting of the stirrup on one side of the table having a lug within it, the adjustable notched eccentric cam operating within said stirrup the spring on the other side of the table, or bed, and the adjustable bumper wedges I and bumper bar K on said side, and the means for imparting an approximately lineal reciprocation to the other end of the table or bed, consisting of the slotted roller secured thereto and the guide rod passing through the roller, substantially as herein described.

7. In an ore concentrator having a percussion table or bed, the bumper blocks, consisting of the fixed wedge, the movable oppositely inclined wedge operating on the face of the fixed wedge, the hanger with thumb nut for adjusting the movable wedge and the bail with set screw for setting said wedge, substantially as herein described.

8. In an ore concentrator having the inclined shaking concentrating table or bed, the apron strip P at the lower end or foot of the table or bed, and having the serrated or notched edge, substantially as herein described.

In witness whereof I have hereunto set my hand.

LUTHER LOOK.

Witnesses:
W. FINNEY,
S. A. CLUER.