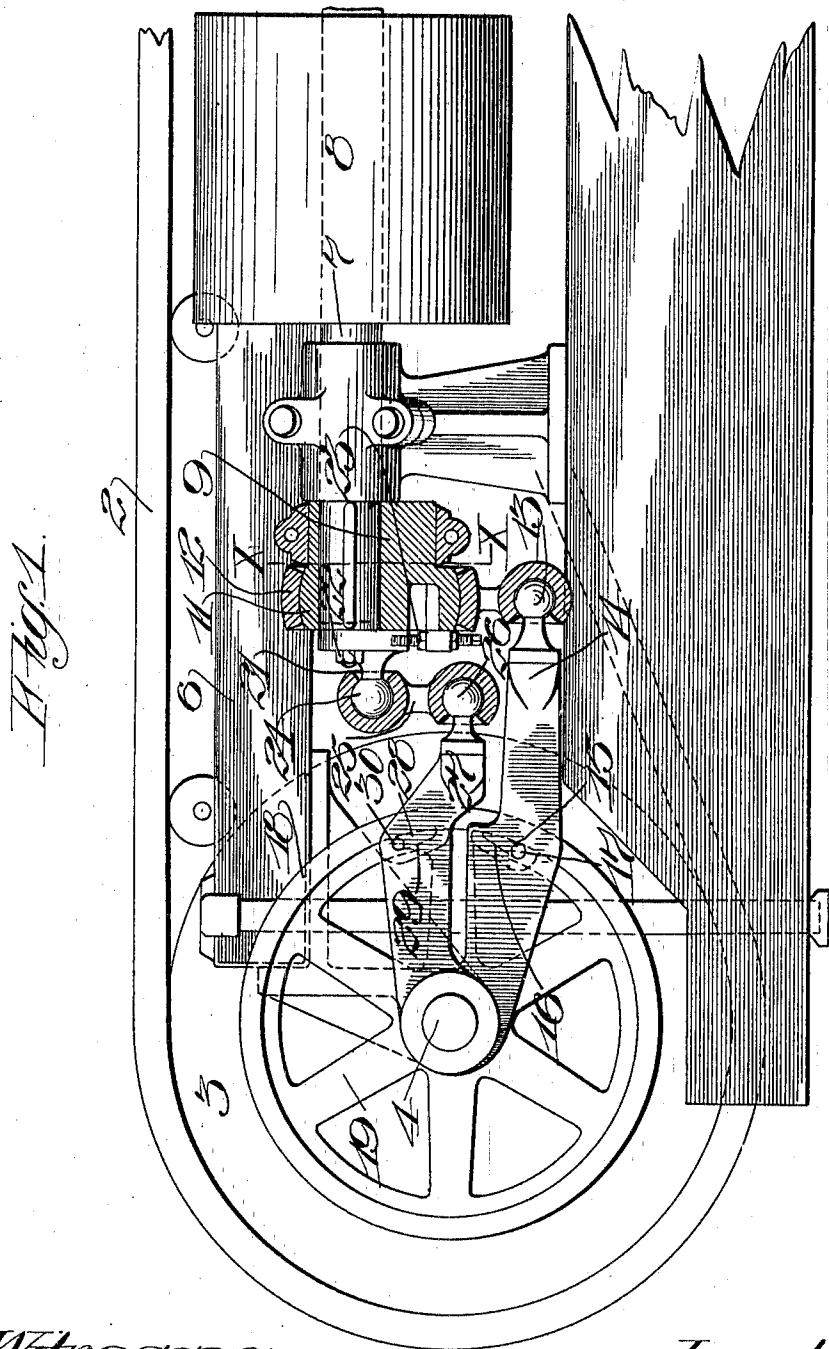


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CONCENTRATOR BELT FEED MECHANISM.
APPLICATION FILED OCT. 28, 1911.

1,059,494.

Patented Apr. 22, 1913.

3 SHEETS-SHEET 1.



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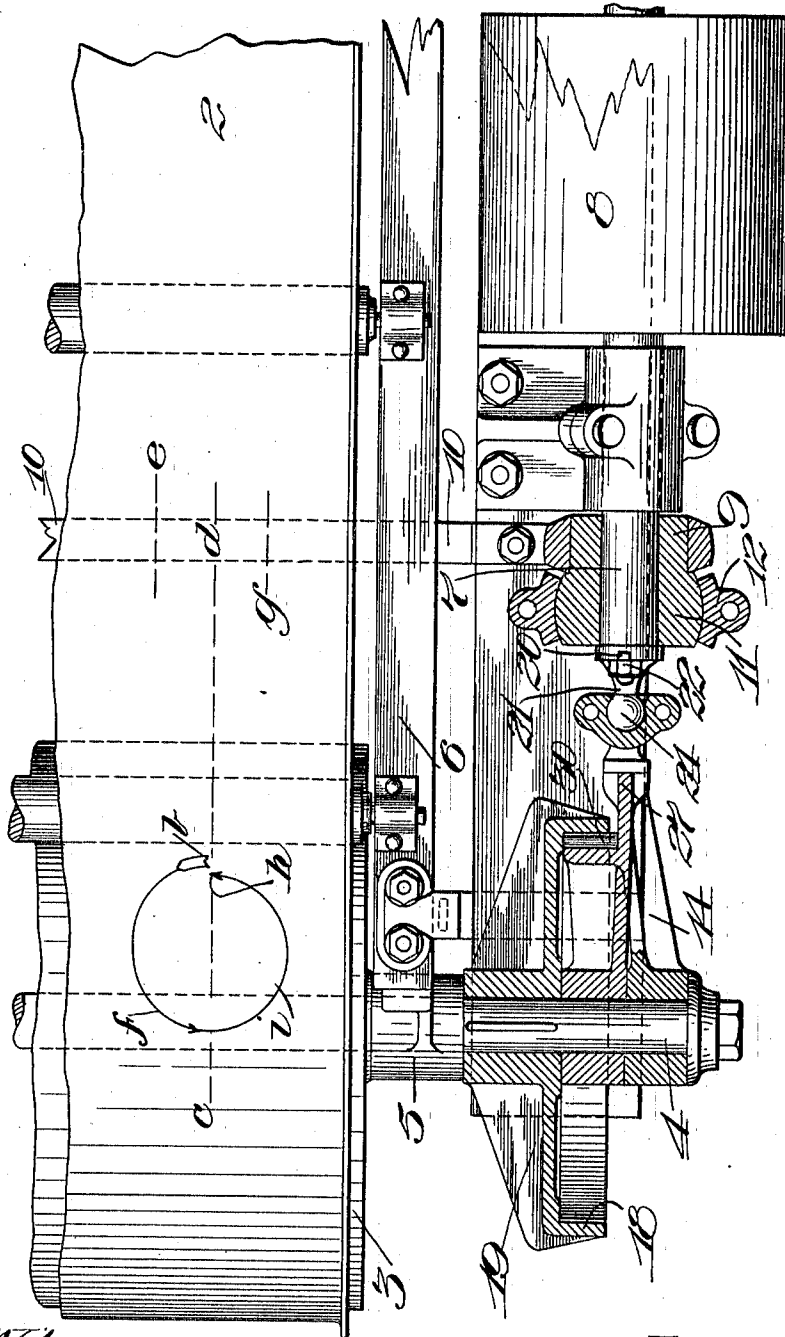


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 5.

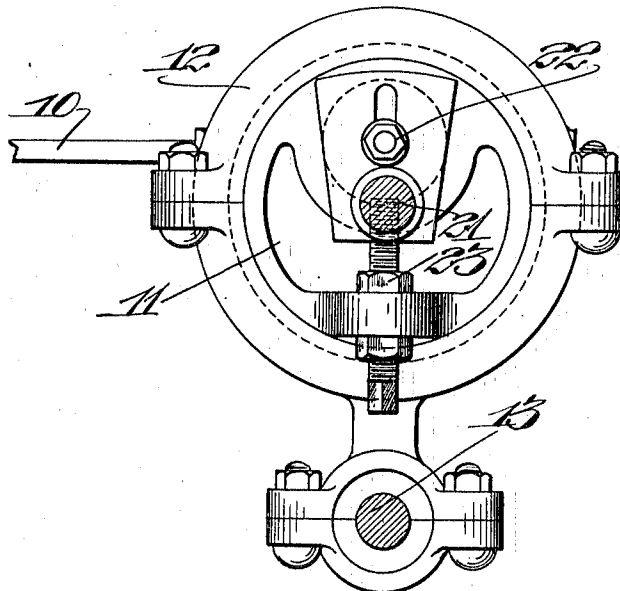
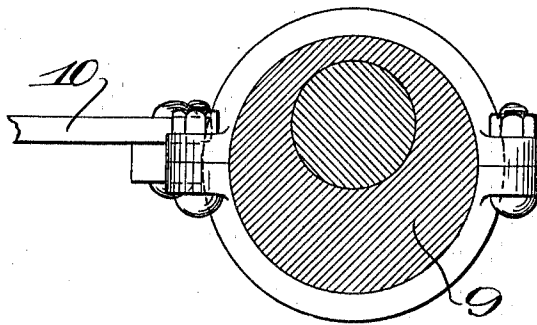


Fig. 4.



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UNITED STATES PATENT OFFICE.

KARL SENN, OF ALAMEDA, CALIFORNIA.

CONCENTRATOR-BELT-FEED MECHANISM.

1,059,494.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed October 28, 1911. Serial No. 657,306.

To all whom it may concern:

Be it known that I, KARL SENN, a citizen of the United States, residing at Alameda, in the county of Alameda and State of California, have invented new and useful Improvements in Concentrator-Belt-Feed Mechanism, of which the following is a specification.

This invention relates to belt concentrators, and particularly to a mechanism for imparting to the traveling belt of the concentrator a peculiar and effective motion for the concentration of values carried by the pulp fed to the belt.

The object of the present invention is to provide a mechanism capable of imparting to a traveling concentrator belt a motion well known as "the motion of a miner's pan;" to provide in combination with a belt concentrator a peculiar mechanism capable of reciprocating the table laterally, and at the same time giving the belt on the table a number of motions, which combined result for one cycle of the mechanism gives to the belt a nearly complete circular motion.

It is a particular object of the invention to devise a substantial, powerful and reliable, power transmitting mechanism whereby the desired motion can be imparted to a traveling concentrator belt without the creation of any sudden jolts or shocks in the mechanism or belt, the result of which would be the reduction of the efficiency of the concentrator; and which mechanism is designed and adjustable to produce a gradual and regular feed of the belt in one direction at each cycle of operation of the mechanism.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the improved mechanism. Fig. 2 is a plan view of the same. Fig. 3 is an end view of the eccentrics. Fig. 4 is a section on line X—X Fig. 1.

Various attempts have been made to impart to a concentrator belt 2, of a well known type of concentrating mechanism, a motion closely simulating that of a miner's pan when manipulated for the concentration of values. In many of these attempts of which I have knowledge, radical deficiencies have been observed which are due largely to the incapacity of the apparatus to operate

without the violent shocks or jerky and irregular movements. It is with the object in view of providing a mechanism capable of imparting to the concentrator belt 2 a motion which will be as free from shock and jerks and as nearly spiral or cycloidal as it is possible to obtain, and at the same time impart a gradual and regular advance or feed of the belt.

In the present instance I have shown only a portion of the belt 2 as traveling around and being supported upon a head cylinder 3, mounted upon and driven by a transverse shaft 4 journaled in appropriate bearings 5 upon a table 6 which is mounted for lateral reciprocations. Mounted to one side of and parallel with the table 6 is a driven shaft 7 upon which is secured a pulley 8 whereby power may be imparted to drive the shaft. Upon the shaft may be secured one or more eccentrics 9, to which are connected connecting rods 19 which are secured appropriately to the table 6. Thus as the shaft 7 is revolved, the eccentric 9 will reciprocate the entire table structure laterally, and this lateral reciprocation of the table 6 will give to the belt 2 a precisely similar lateral side shake. In producing the desired motion of the belt, I employ another eccentric, as 11, which is secured upon the shaft 7 and upon which is mounted an eccentric strap 12, one end of which is formed with a ball and socket joint 13, in which joint is connected the outer or swinging end of an arm or lever 14 which is loosely fulcrumed at its other end upon the cylinder shaft 4. Intermediate its end there is formed in the lever 14 a pocket or chamber 15 having a rear inclined wall 16. In the pocket 15 there is mounted a clutch device, as a ball or roller 17, which is adapted to rise into frictional and binding engagement with the flange 18 of a clutch wheel 19 which is keyed or otherwise secured on the head shaft 4.

It is well to state here that the center of the eccentric 11 is in the same radial line with the center of the eccentric 9 which imparts to the table 6 and belt 2 a side shake. In the present instance I have shown the eccentrics 9 and 11 as being formed in one piece, the outer end of which is diametrically slotted, as at 20, to receive an adjustable crank 21 which may be secured in juxtaposition by suitable locking devices, as a set screw 22 and a lock screw 23. The

crank 21 is adjustable in the same radial line in which are positioned the centers of the eccentrics 9 and 11. The particular arrangement of the centers of the eccentrics and the crank is an important and essential feature in the production of the desired motion in the concentrator belt 2.

The crank 21 is provided with a ball 24 upon which may swing one end of a link 25, the lower end of which is provided with a socket to receive a ball 26 formed on the outer end of an arm or lever 27 which also is loosely mounted upon the head-shaft 4. The lever 27 is recessed at 28 and has an inclined wall 29. In the recess 28 of the arm 27 is mounted a clutch device, as a roller or cylinder 30, adapted to engage the inner surface of the drum flange 18.

The clutch devices 17 and 30 are designed to engage the drum flange 18 in one instance when their respective arms are operative, in the case of the pin 17 in arm 14 during the downward movement of the latter, and in the case of the pin or roller 30 in the upward movement of its arm 27. In other words, during the rotation of the shaft 7 with its eccentrics and the crank when the arm 14 is moving upward, its respective clutch roller 17 drops in its recess 15 and is therefore inoperative and free of the drum flange 18; whereas during the upward movement of the arm 27, which occurs at the same time as the upward movement of the arm 14, the clutch roller 30 rolls downward in its respective recess until it contacts with and binds upon the inner surface of the flange 18, thus causing the clutch wheel as it is rotated to turn the shaft 4 and the head cylinder 3 and thus move the belt 2 upwardly and forwardly a determined amount. This forward movement of the belt 2 will occur during a complete one-half cycle or one-half revolution of the shaft 7 and the crank 21 which operates the arm 27 and through its respective clutch 30 turns the belt-feeding drum 3. Obviously as the remaining one-half revolution of the shaft begins, the levers 14 and 27 will start downward, at which instant the clutch 30 will become inoperative and the clutch 17 will become operative and thus engage and turn the drum wheel 19.

If the proportions of the parts and the relative throws of the eccentric 11 and the crank 21 were so designed, the annular movement of the drum 19 could be made of equal successive lengths. In other words, the arc of movement given to the drum 19 in one direction might be made, for instance, twenty degrees and the opposite movement of the drum made an equal number of degrees, in which case the belt 2 would simply move forward and backward equal length steps and there would be no advance in one direction whatever.

To insure a regular and uniform feed of the belt 2 I have made one of the actuating structures, as the crank 21, adjustable so that the arc through which the lever 27 would move could be increased or decreased as desired, and I have shown the eccentric 11 as having a substantially fixed throw relative the shaft 7 as it is only necessary to make one of the lever actuating devices adjustable in order to produce the desired result.

The operation of the mechanism will be as follows: Having adjusted the centers of the eccentric 9, eccentric 11 and crank 21 in a common radius from the center of the shaft and then moving the shaft to a position shown in Fig. 1, at which place the arms 14 and 27 will be in their lowermost positions and the table 6 will be in a position approximately the center of its complete lateral reciprocation, if now the shaft 7 be given a one-half revolution in the direction of arrow *a*, the arms 14 and 27 will start to swing upward and the clutch 30 will become effective to turn the clutch wheel 19 in an arc equal to the movement of the lever 27, which movement of the clutch wheel 19 will turn the head cylinder 3 and advance the belt from a point *b*, Fig. 2, to the point *c*. During this forward movement of the belt 2 from the point *b* to the point *c* about the cylinder 3, there will simultaneously occur a movement of the table 6 from its central position *d* to the extreme opposite position on one side, as at *e*, and the resulting composite movement of the belt 2 around the cylinder and the side shake of the table from its center position to the extreme on one side will give to the belt 2 a nearly semicircular movement through its entire area, which movement is indicated by the curved line *f*, Fig. 2. Having turned the shaft a one-half revolution so that the centers of the eccentrics 9 and 11 and the crank 21 are swung from lowermost position to the uppermost position relative to the shaft, the continuation of the cycle of movement for the remaining one-half revolution of the shaft imparts to the arms 14 and 27 a downward movement, at the beginning of which the clutch 30 in arm 27 becomes inoperative and the clutch roller 17 in arm 14 becomes operative and thus engages and turns the clutch wheel 19. Due to the difference of their respective lengths and due to the difference of the eccentricity of the centers of the eccentric 11 and the crank 21, the arms 14 and 27 move in arcs of different lengths.

In the present instance the eccentricities and proportions of the parts are such that the lever 14 will move in a smaller arc during a one-half throw of the shaft 7 than will the arm 27, and therefore the clutch roller 17 will be able to turn the clutch wheel 19 to a less extent or in a shorter arc than is

imparted to it by the clutch roller 30. Thus the difference in the length of movement of the two arms results in a difference in the forward feed of the belt by its cylinder 3 when moved by the arm 27, because the arm 14 when it becomes operative to reverse the direction of travel of the belt will move it backward a less distance than it was moved forward by the arm 27.

10 In practice I find that in order to produce the closest approximation to a motion of a miner's pan that the rearward motion of the belt 2 might be equal to the total side shake of the table 6, and, therefore it will be observed that as the arm 14 is making its
15 downward stroke it will turn the cylinder 3 sufficiently to give the belt 2 a motion equal to the full side shake of the table, which latter is simultaneously being moved from
20 its center position *d* toward its extreme opposite throw, indicated at *g*, and by the time the complete half turn of the shaft 7 is made the table will have been moved from the center line or position *d* to the limits of its
25 motion *g* and back to *d*, simultaneously with which side shake the belt 2 has been moved from the point *c* rearward to the point *h*; the resultant effect of the side shake and back-feed being as indicated a true semicircular motion shown by the line *i* in the diagram on Fig. 2.

From the foregoing description it will be manifest that, with the table at the center of its lateral side shake, and at which time
35 a point on the belt 2 will be at the place indicated at *b*, Fig. 2, during a one-half revolution of the shaft 7, the table will be shifted from its center position to the limit of its side shake in one direction at *e*. Simultaneously therewith the belt 2 will be advanced
40 from the point *b* so long as the lever 27 and its clutch 30 are moving upward. By the time the table 6 is returned from its

limit of movement at *e* back to its central position *d*, the whole advance of the belt 2 45 will have been made and every point of which would have been carried in an orbit or path represented by the curved line *f*.

As the table 6 is carried from the center position *d* for the remaining portion of its 50 side shake to the line *g*, the arm 14 will become effective to reverse the direction of motion of the belt 2 and carry it back to the point *h*; the distance between the point *c* and the point *h* representing the direct back- 55 feed of the belt, and the distance between the point *h* and the point *b* representing the exact amount which every point in the belt has actually advanced from the beginning of operation of a single cycle of the mechanism when the belt was started from the 60 point indicated at *b*.

Having thus described my invention, what I claim and desire to secure by Letters Patent is— 65

The combination with a table and supports upon which it is capable of movement in a single direction, of an eccentric upon a horizontally revoluble shaft, connections between said eccentric and the side of the 70 table, a shaft parallel with the head of the table having a pulley secured thereon, clutches engaging the pulley rim alternately in opposite directions, a crank upon the eccentric shaft having its throw in alinement 75 with that of the eccentric, arms by which the clutches are actuated, and links connecting said arms with the crank and the eccentric respectively.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

KARL SENN.

Witnesses:

G. H. STRONG,
CHARLES EDELMAN.