(No Model.) 2 Sheets—Sheet 1.

# W. G. DODD.

## ORE CONCENTRATOR.

No. 556,089. Patented Mar. 10, 1896.

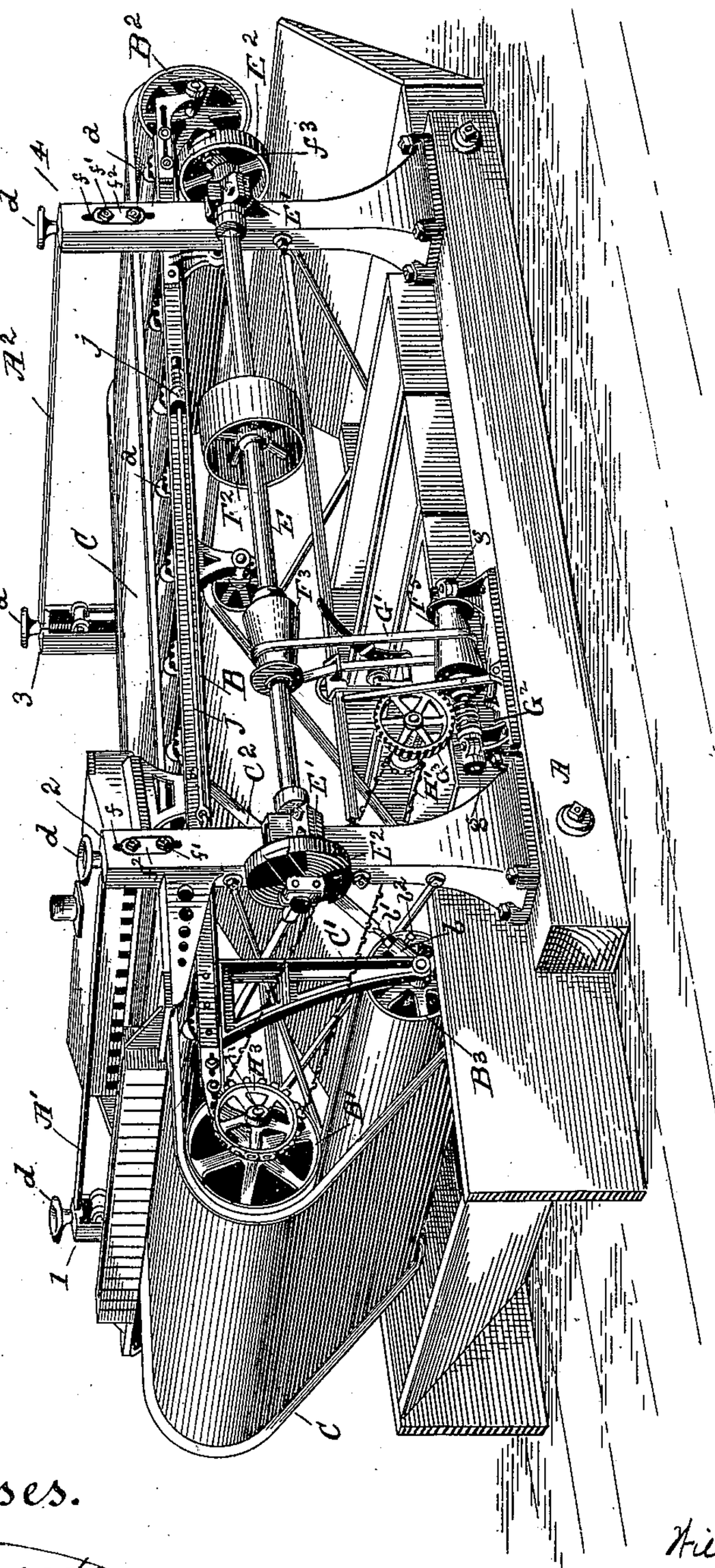

Fig. 1.

Witnesses.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

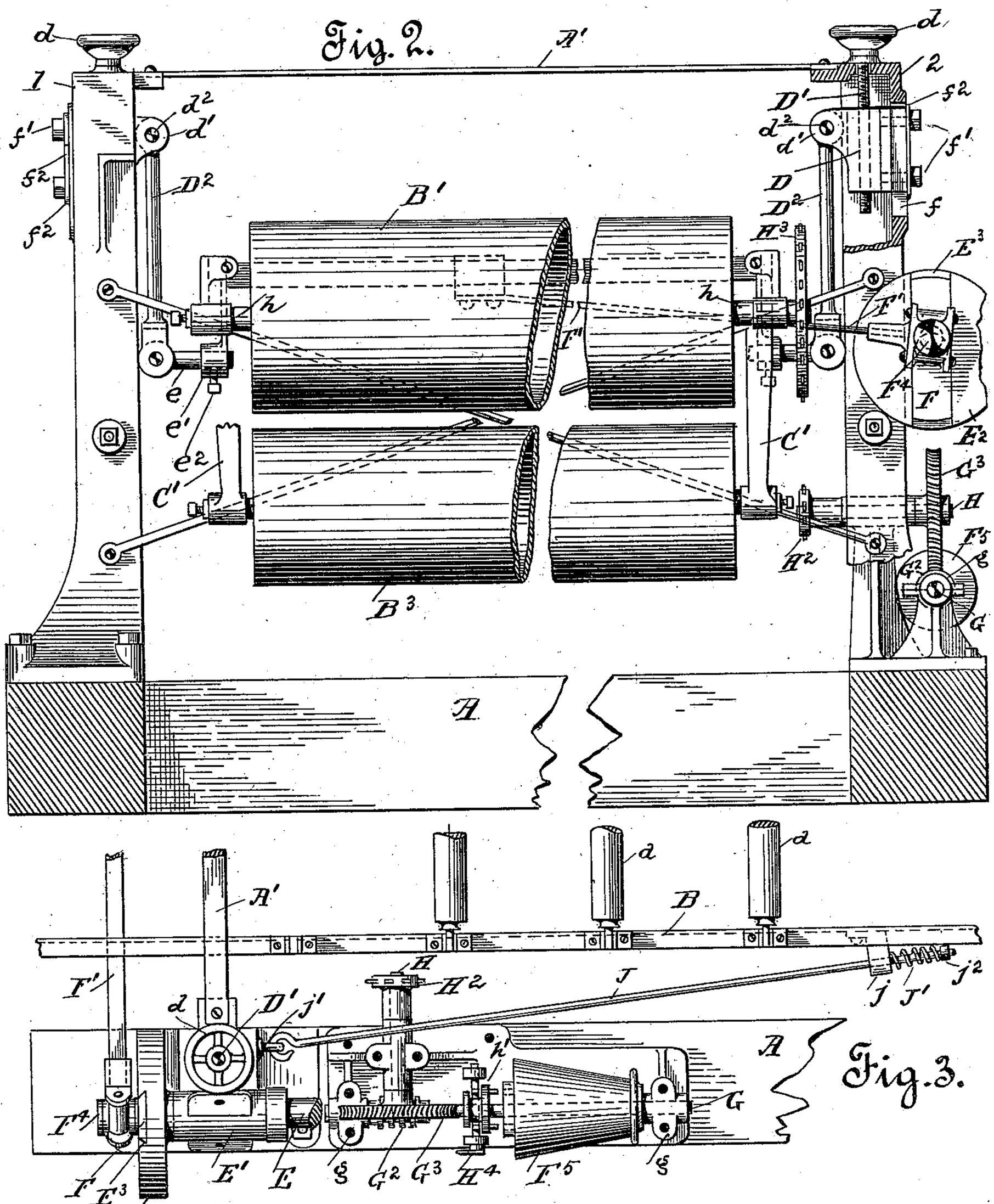
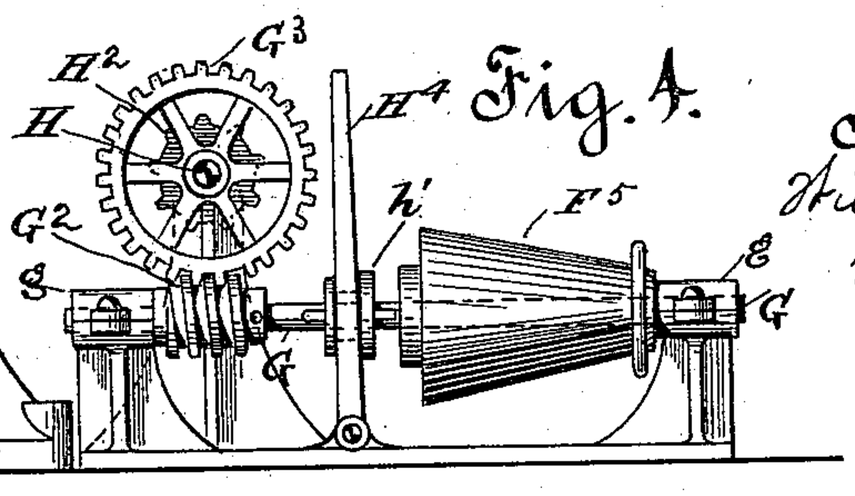



Fig. 3.




Fig. 4.




Witnesses.

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# UNITED STATES PATENT OFFICE.

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## ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 556,089, dated March 10, 1896.

Application filed June 11, 1895. Serial No. 552,437. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIS G. DODD, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Ore-Concentrators; and I do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

The present invention relates to a certain new and useful improvement in ore-concentrators, which consists in the arrangement of parts and the details of construction, as will be hereinafter fully set forth in the drawings and described and pointed out in the specification.

The invention relates more especially to the mechanism for controlling the side shake or movement of the swinging concentrator frame or table, the same being of such a character as to permit of adjustment, so as to vary the throw or lateral swing of the swinging frame, in order to adapt the machine to meet the requirements of the various kinds of ore. Certain ores require that a quick heavy shake be imparted to the swinging frame and belt, in order to cause the separation of the valuable metal, and others that a gentle or light agitation be given to the swinging frame and belt. Again, for the working of one kind of ore it may be preferable that the concentrating belt or table swing in a horizontal plane, while with other ores it is advisable that the swinging frame be permitted to describe an arc of a circle during its movement.

The object of my invention is to provide a concentrator having a swinging frame with mechanism capable of such adjustment as to permit of the swing of the concentrator-frame being varied so as to adapt the concentrator to the efficient working of the various grades or classes of ore.

In order fully to understand my invention, reference must be had to the accompanying sheet of drawings, forming a part of this application, wherein—

Figure 1 is a perspective view of the entire concentrator. Fig. 2 is a front view in elevation, partly broken away, with the concentrator-belt removed. Fig. 3 is a detail broken top plan view showing the drive mechanism for the endless belt, a portion of the concentrating-frame, and one of the thrust-rods connected to the sides of the swinging frame and the standard of the machine; and Fig. 4 is a broken detail view in side elevation of the drive mechanism.

The letter A is used to indicate the base of the machine, which may be of any desired shape. To this base I bolt or otherwise secure the box-standards 1 2 3 4, one at each corner of the base. The two forward standards are united by the cross or tie rod A′ and the rear standards by the cross or tie rod $A^2$. These standards project upwardly above the base A a given distance, and between the said standards is suspended and works the swinging frame B. At the forward end of the swinging frame B is secured the drive-roll B′ and at the rear end the roll $B^2$, over which rolls and the roll $B^3$ travels the endless concentrating-belt C. This belt is supported upon the swinging frame and is prevented from sagging by the small transverse rolls *a* which work in bearings of the said swinging frame.

The roll $B^3$ is suspended below the forward end of the swinging frame by means of the brackets C′ depending from the forward end of the said frame, Figs. 1 and 2. These brackets I hold rigid by means of the brace-rod $C^2$, which forms connection between the lower end of the bracket and the side of the swinging frame.

By reference to Fig. 1 it will be observed that the lower end of the brace-rod is screw-threaded and fits within the thimble *b* projecting from the bracket C′, passing through the screw-nut *b*′. This nut, as turned to the right or to the left, forces the lower end of the brace-rod in or out of the thimble. Consequently the brace-rod may be lengthened or shortened so as to take up any play of the roll $B^3$, which is apt to occur by reason of the jolting motion of the swinging frame. The lower end of the brace-rod is held firmly within the thimble *b*, after adjustment, by means of the set-screw $b^2$.

Within each of the box-standards is fitted one of the slide-blocks D, which blocks are raised or lowered by means of the screw-rods D′. These rods fit through the top of the

box-standards, Fig. 2, and work within a screw-threaded opening cut through the said slide-blocks vertically. To the upper end of the screw-rod is secured the enlarged head *d*, which holds the rod in place and serves as a hand-wheel by which to turn the screw-rod to the right or to the left. Connection is made between the slide-blocks and the swinging frame by means of the links $D^2$, the upper ends of which links are secured between the ears *d'* projecting from the slide-block by pin $d^2$, while the lower ends of said links are secured to the outer end of the rod *e*. This rod works through the eye of the bracket *e'* depending from the swinging frame B. The rod *e* projects laterally from the swinging frame. Consequently the connecting-links are secured to the said frame at a right angle thereto. The rod *e* is held in place within the eye of the bracket *e'* by the set-screw $e^2$. By loosening the set-screw the rod *e* may be moved in or out so as to adjust the inclination or angle of the supporting or connecting links of the swinging frame.

Through the outer face of the box-standards I cut an elongated slot, (represented by the letter *f*,) through which the screw-bolts *f'* extend. These bolts pass through the face-plate $f^2$, which covers the opening formed by elongated slot *f*, and the inner ends thereof fit within the screw-threaded sockets formed in the back of the slide-blocks D, Fig. 2. These screw-bolts hold the slide-blocks in their adjusted position, for as the same are screwed up they cause the face-plate $f^2$ to bear tightly against the outer face of the box-standards. In order to adjust the slide-blocks, it is first necessary to loosen the screw-bolts *f'* so as to release the face-plate.

Below the swinging frame I locate the parallel shaft E, which works within bearing-boxes E' secured to the outer face of the box-standards 2 4. To each end of the shaft E, I secure the cam $E^2$, in the outer face of which is cut the transverse groove $E^3$, within which is fitted the slide-block F held in place by a set-screw $f^3$. To this slide or adjustable block is connected the crank-pin $F^4$, from which pin projects the crank-rod F', the inner end of which is fastened to the swinging frame B, Fig. 2. As the crank-pin is carried around, the swinging frame B has a lateral or side shake imparted thereto, the length of the throw being regulated by the adjustment imparted to the slide-block to which the crank-pin is attached.

The shaft E is driven through the medium of a drive-belt (not shown) working over the belt-wheel $F^2$ secured upon the said shaft.

Upon the shaft E is fastened the cone-shaped pulley $F^3$, which is connected with the cone-shaped pulley $F^5$, loosely secured upon the shaft G by the belt G'. This shaft works within bearing *g*, and said shaft is located a distance below the drive-shaft E. Upon this shaft is secured the worm-gear $G^2$, which engages the teeth of the gear $G^3$. This gear is fastened to the outer end of the short cross-shaft H, located above the shaft G, Fig. 4.

The motion of the shaft H, derived from the shaft G through the medium of the mechanism described, is transmitted to the roll B' through the medium of the sprocket-chain H', which works over the sprocket-wheel $H^2$, secured to the inner end of the shaft H, and the sprocket-wheel $H^3$ secured to the axle *h* of the roll B'. As rotary motion is imparted to this roll, the endless concentrating-belt is caused to travel over the swinging frame.

Upon the shaft G is located the clutch-collar *h'*, which is thrown in or out of engagement with the forward end of the cone-shaped pulley $F^5$ by means of the lever $H^4$. When the clutch-collar is thrown into engagement with the cone-shaped pulley $F^5$, the motion of the drive-shaft E is imparted to the shaft G, in order to drive the endless concentrating-belt through the medium of the before-described mechanism, while in order to stop the travel of said belt it is only necessary to throw the clutch-collar out of engagement with the cone-shaped pulley $F^5$. The travel or forward movement of the concentrating-belt may thus be stopped without causing a stoppage of the mechanism for operating the swinging frame.

In order to take up the thrust movement of the swinging frame, I provide the thrust-rods J, one at each side of the frame. These rods pass through the ears *j* projecting from the side of the swinging frame, and the forward end of one thrust-rod is secured to the eyebolt *j'* projecting from the standard 2, Fig. 3, and the forward end of the opposite thrust-rod is secured to an eyebolt (not shown) projecting from the standard *l*. Between the nut $j^2$, secured to the rear end of each thrust-rod and the ear *j*, I locate the coiled spring J'. This spring takes up such thrust movement as there may be imparted to the swinging frame during the working of the machine.

By my manner of suspending the swinging frame of the concentrator I am enabled readily to raise or lower either the forward or rear end of the said frame in order to vary the inclination of the concentrating-belt, which feature is of special importance in this class of concentrators, for the reason that certain kinds of ore require that the inclination of the concentrating-belt be very slight, while for the working of other kinds of ore a greater inclination may be given to the said belt. Again, by my manner of connecting the supporting-links they may be adjusted so as to cause the concentrating-table to move in a horizontal plane or cause the said frame to move in an arc of a circle, thus adapting the machine for the efficient working of the various kinds of ores.

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

1. In an ore-concentrator, the combination,

with the swinging or shaking frame, of the endless belt arranged to travel thereover, mechanism for imparting continuous forward travel to said belt comprising a flexible driving member, adjustable mechanism for imparting a side shake to the swinging frame, the supporting-links for the swinging frame, devices for giving vertical adjustment to said links and devices for imparting lateral adjustment to said links in order to vary the movement of the swinging frame.

2. In an ore-concentrator, the combination, with the base, of the box-standards secured to and extending above the base, the swinging frame arranged between said standards, the endless belt arranged to travel over said frame, mechanism for imparting continuous forward travel to said belt comprising an endless belt, adjustable mechanism for imparting a lateral shake to the swinging frame, the slide-blocks secured within the box-standards, devices for raising or lowering the slide-blocks, the supporting-links for the swinging frame pivoted at one end to the slide-blocks and the laterally-adjustable device connected to the swinging frame, to which the opposite ends of the supporting-links are pivoted.

3. In an ore-concentrator, the combination, with the base, of the standards secured to and extending above the said base, the swinging frame arranged between the standards, the adjustable slide-blocks connected to the said standards, the supporting-links for the swinging frame pivoted at one end to the adjustable slide-blocks, the laterally-adjustable devices connected to the swinging frame, to which the opposite ends of the supporting-links are pivoted, and the thrust-rods yieldingly connected to the swinging frame and the forward standards.

4. In a concentrator, the combination, with the standards, of the swinging frame arranged between the standards, the supporting-links for sustaining the frame, the laterally-extending devices adjustably connected to the swinging frame and to the outer ends of which the lower ends of the supporting-links are pivoted, the slide-blocks connected to the standards and to which the opposite ends of the said links are pivoted, devices for raising or lowering the slide-blocks, independent means for locking the sliding blocks in their adjusted positions, and means for imparting a side shake to the swinging frame.

5. In a concentrator, the combination, with the swinging frame, of the rolls secured at each end thereof, the brackets depending from the forward end of the frame, the rolls mounted in the lower ends of the brackets, the endless belt arranged to travel over said rolls, the adjustable brace-rods forming connection between the frame and the lower ends of the depending brackets, mechanism for imparting a side shake to the swinging frame and continuous forward travel to the endless belt, the supporting-links for sustaining the swinging frame and of mechanism for imparting a vertical and lateral adjustment to the supporting-links.

6. In a concentrator, the combination, with the swinging frame, of means for imparting a side shake to the said frame, the supporting-links for sustaining the swinging frame, of means for imparting a vertical adjustment to the supporting-links, and laterally-adjustable connections between the lower ends of the links and frame.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIS G. DODD.

Witnesses:
N. A. ACKER,
LEE D. CRAIG.