No. 869,860. PATENTED OCT. 29, 1907.

F. E. SHEPARD.

ORE CONCENTRATING TABLE.

APPLICATION FILED JUNE 4, 1906.

2 SHEETS—SHEET 1.

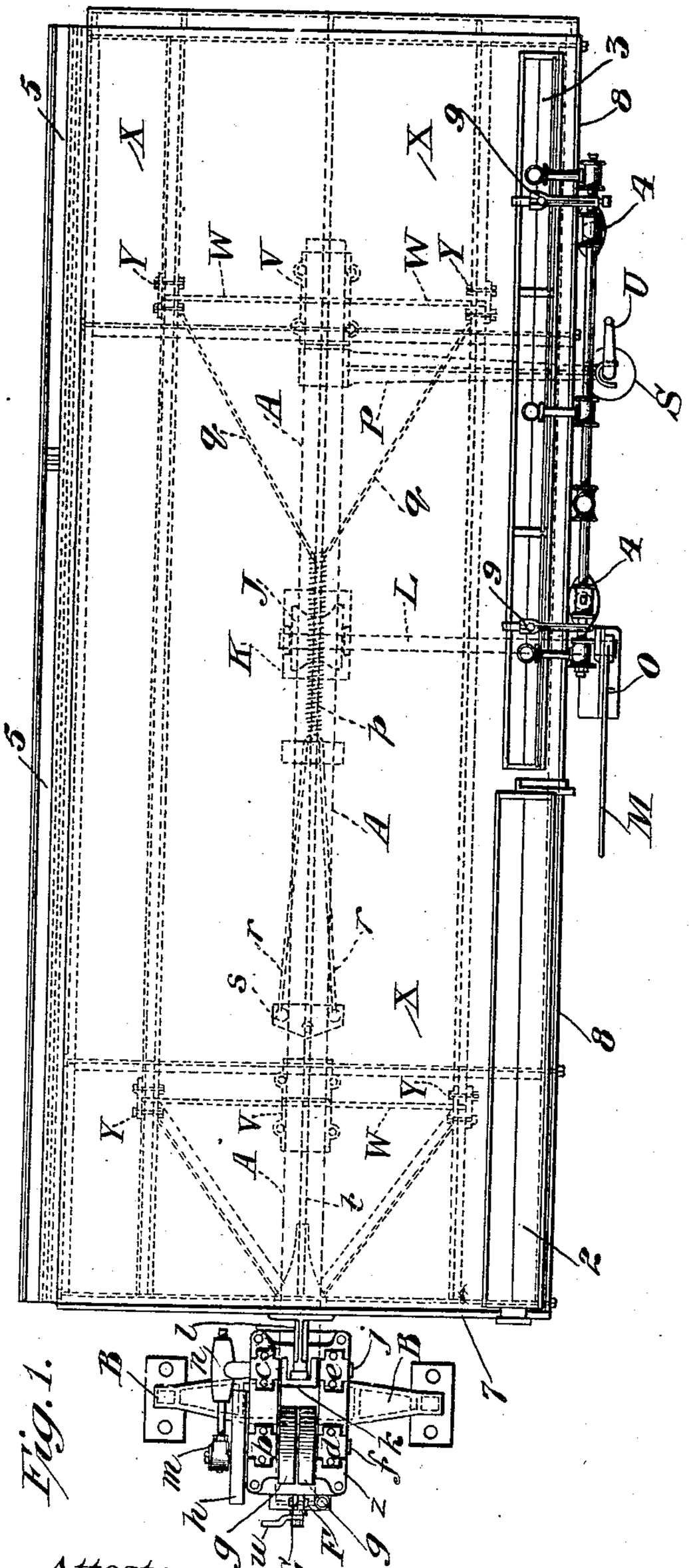

Fig. 1.

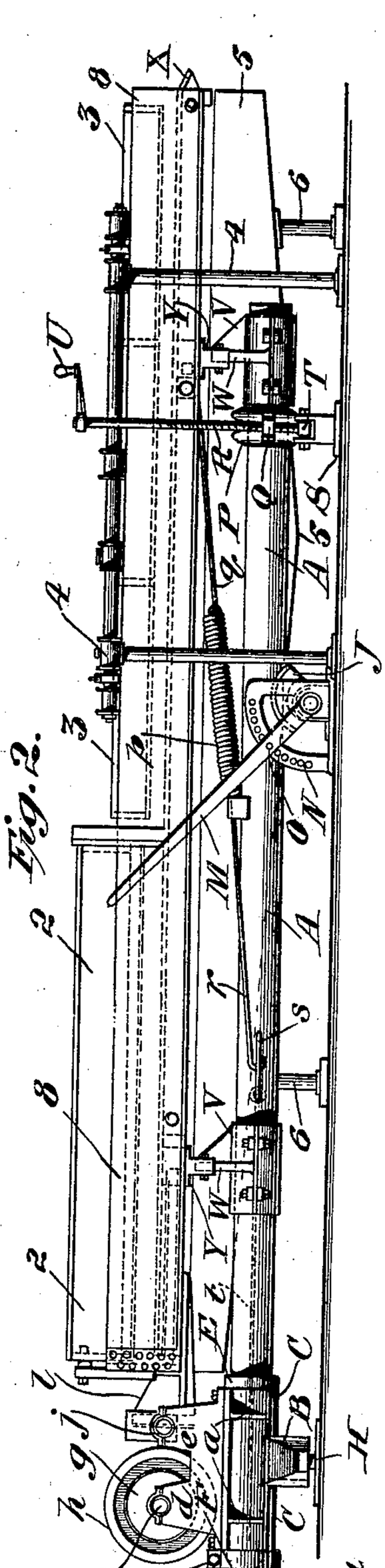

Fig. 2.

Attest:

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Leo J. Matty

Inventor:

FRANK E. SHEPARD

by Dickerson, Brown,

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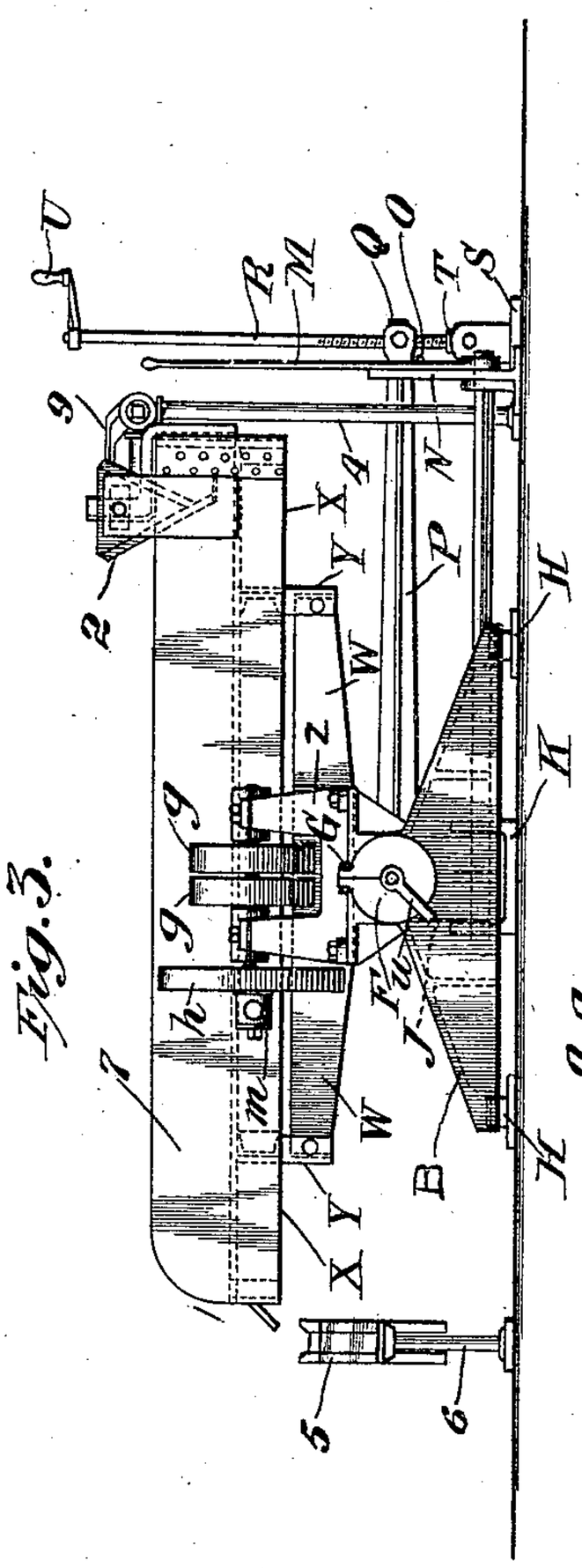

Fig. 3.

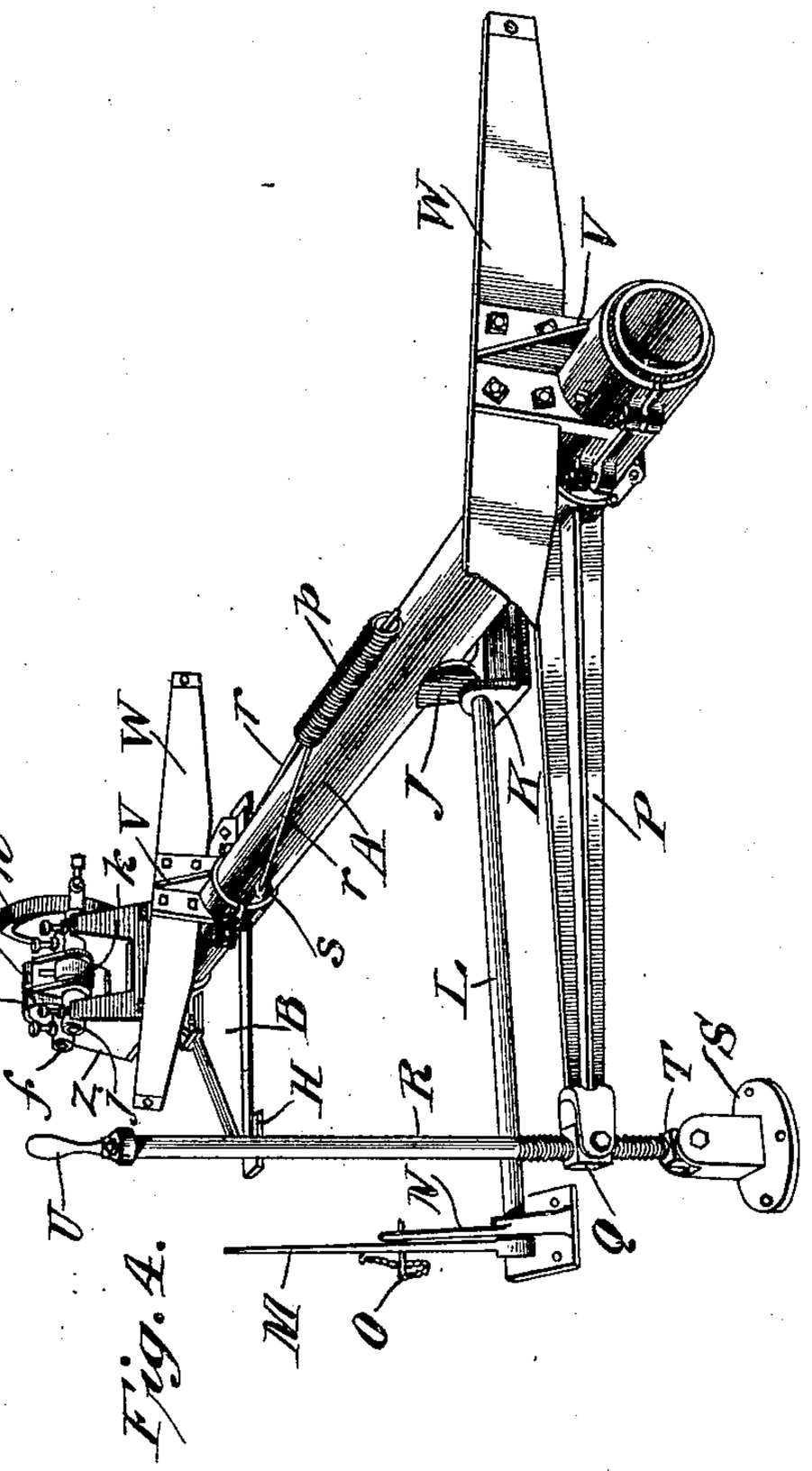

Fig. 4.

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UNITED STATES PATENT OFFICE.

FRANK E. SHEPARD, OF DENVER, COLORADO, ASSIGNOR TO THE DENVER ENGINEERING WORKS CO., A CORPORATION OF COLORADO.

ORE-CONCENTRATING TABLE.

No. 869,860. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed June 4, 1906. Serial No. 320,174.

To all whom it may concern:

Be it known that I, FRANK E. SHEPARD, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented a new and useful Ore-Concentrating Table, of which the following is a specification, accompanied by drawings.

My invention relates to improvements in ore concentrating tables, and the objects of my invention are to improve upon the construction of such devices, and increase their efficiency of operation, with simplicity of parts and cheapness of manufacture.

Other objects are to secure lightness and strength and afford provision for ready adjustability into different positions as desired.

To the accomplishment of these objects and such others as may hereinafter appear, the invention comprises the novel construction and combination of parts hereinafter described and particularly pointed out in a preferred form, reference being had to the accompanying drawings forming a part hereof, in which the same reference characters designate like parts throughout the several views, and in which

Figure 1 is a plan view of the concentrating table, showing portions of the frame in dotted lines. Fig. 2 is a side elevation. Fig. 3 is an end elevation of the head end of the table. Fig. 4 is a perspective view of the frame of the device, the table being removed.

Referring to the drawings, the frame in this instance consists of the pipe or member A, one end of which is revolubly secured to the base B by means of the sleeve C through which one end of the pipe A passes. The pipe A is preferably free to revolve in the sleeve C, but it is prevented from moving longitudinally by means of the collar E and the split cap F, the collar E and the split cap F being secured to the pipe A at each end of the sleeve C. The split cap F is provided with internal threads which screw over threads on the end of the pipe A and is held in position by means of the set bolt G.

The frame is suitably supported upon bearings at three points, so as to permit the frame to be easily adjusted, and at the same time to facilitate the mounting of the frame upon any foundation, whether even or uneven. Two bearings H and H pivotally support the frame at one end, underneath each end of the base B. The other end of the frame or pipe A rests upon the cam J, which is pivotally connected to the base K. The two bearings H and H are so constructed as to permit the base B which supports one end of the frame to be rocked thereon. The cam J which forms the third bearing of the frame is, in this instance, provided on its cam surface with a suitable groove in which the pipe A rests. To facilitate the operative movement of the cam J, a base K is provided for pivotally supporting the cam J upon the rod L, which rod is long enough to permit the lever M secured to its outer end to be placed outside the edge of the table which is to be supported on the frame. The quadrant N is secured to the floor and supports the outer end of the rod L. The quadrant N is preferably provided with a series of holes for engaging the pin O, which passes through a hole in the lever M for the purpose of locking the cam J in any desired position. By moving the lever M back and forth, the cam J will adjust the longitudinal inclination of the frame by raising or lowering one end of the frame, while the other end of the frame rocks upon the pivotal bearings H and H which act as a fulcrum.

The longitudinal inclination of the frame can only be adjusted by means of the cam J, and independent means are provided for adjusting the transverse inclination of the frame. To the pipe A is secured an arm P, which can be made any length but is preferably made long enough to extend to the side of the supported table, so that it will be easily accessible. The outer end of the arm P is pivotally secured to the nut Q through which passes the threaded shaft R. The lower end of the threaded shaft R is supported in a step bearing T pivoted on a base S. The upper end of the threaded shaft R is provided with a crank U by means of which the threaded shaft R is turned in the step bearing T, thereby raising or lowering the nut Q on the thread of the shaft R. The pipe A, to which the inner end of the arm P is secured, is revolved about its longitudinal axis when the outer end of the arm P is raised or lowered, as the pipe A is free to revolve in the sleeve C and on the cam J

The movement of the pipe A about its longitudinal axis as above described provides for the transverse inclination of the table and is entirely independent of the means for adjusting the longitudinal inclination of the frame.

On the pipe A are secured the castings V, to which are fastened flexible wooden or steel blades or cross supports W placed at right angles to the pipe A. The table X, is suitably braced and is fastened to the ends of the blades W by means of the sockets or upright connections Y which are placed underneath the top of the table X. The table X may now vibrate in a plane parallel to the axis of the pipe A by the bending of the blades W. The bending of the blades W is in the direction of the smallest dimension, or the thickness of the blade. The depth of the blade is of sufficient dimension to prevent any vertical deflection of the same. The table top X is vibrated by means of the head motion Z which may be of any suitable form of mechanism to give a reciprocating motion to the table. The head motion in this instance is suitably supported on top of the sleeve C, which is provided with suitable brackets *a* to which the head motion mechanism is

bolted. The head motion Z has four bearings *b*, *c*, *d*, *e*, upon two of which is mounted the pulley shaft *f*, which holds the two pulleys *g*, one of which is tight and the other loose on the shaft *f*. To the end of the shaft *f* is secured the fly-wheel *h*. The two other bearings support the cam shaft *j*. The cam *k* on the shaft *j* is made to engage against the edge of the table X or a suitable projection *l* thereon, so that when the shaft *j* is oscillated a longitudinal vibration is imparted to the table X by means of the cam *k* on the shaft *j*. To oscillate or rock the cam *k* on the shaft *j*, an eccentric rod *m* is pivoted eccentrically at one end to the fly-wheel *h;* the other end of the eccentric rod *m* is made to reciprocate back and forth in the sleeve *n* which is secured to the cam shaft *j*, thereby imparting an oscillating motion to the shaft *j*. The edge of the table X is forced up against the face of the cam *k* and the flexible blades W may be placed in tension by moving the castings V slightly in the direction of the cam *k* until the required amount of tension is secured. The head motion can then be operated and, due to the flexibility of the blades W, the edge of the table X is always kept against the surface of the cam *k*, which imparts a reciprocating motion to the table X.

In some cases it may be desired to make use of a suitable spring *p* for the purpose of keeping the table X in operative position against the cam *k*. One end of the spring *p* is suitably connected to the bottom of the table X by means of the fork *q*. The other end of the spring *p* is suitably connected by means of another fork *r* to the tie plate *s*, which is inserted in a longitudinal slit in the pipe 10. The tie plate *s* is secured inside the pipe A to one end of the rod *t*, while the other end of the rod *t* extends out through a hole in the cap F on the end of the pipe A. A suitable hand nut *u* is provided to screw on to the end of the rod *t*, whereby the tension of the spring *p* is varied by screwing the hand nut *u*, thereby pulling the table up firmly against the cam *k*, which, when in operation, gives the longitudinal motion to the table X.

To the side of the table X is suitably secured the feed box 2, into which the material to be concentrated is fed, and out of which the material is discharged upon the surface of the table X. A suitable wash water box 3 is supported upon the floor by means of the water pipes 4 and made to hang over the edge of the table X adjacent to the feed box 2. The water is discharged upon the table X from the water box 3, which is kept supplied with water by means of the water pipes 4. On the opposite side underneath the edge of the table is the catch launder 5, suitably supported on the floor by means of the posts 6. The launder 5 is provided for catching the tailings as they leave the table X.

At the head and upper side of the table X suitable boards 7 and 8 are provided for the purpose of keeping the material from running over the upper side and head of the table X.

The feed box 2 is preferably secured to the inside of the board 8 and moves with the table X.

The water box 3 is suspended over the board 8 by means of brackets 9 which are secured to the water pipes 4, whereby the water box 3 does not move with the table.

The operation of the device is as follows:—The table reciprocates back and forth as above described and the material to be concentrated is discharged from feed box 2, to the top of the table X. The mineral portions, or those of greater specific gravity are carried to the end of the table surface opposite the head motion, under the influence of the longitudinal reciprocating movement; whereas the gangue, or lighter particles of the pulp are washed sidewise to the catch launder 5 by means of the current of wash water from box 3. Various forms of riffled surfaces may be used in connection with this frame.

A frame constructed in the above described manner can be set on any kind of foundation, without carefully leveling the same before placing the frame in position. After the frame has been placed in position the settling of the foundation or floor upon which the frame rests can be very readily compensated for without leveling the foundation or removing the frame from its position. The frame being supported in the manner described can be adjusted in any desirable manner by operating only two means, each of which is independent of the other, one means adjusting the longitudinal inclination of the frame, while the other adjusts the transverse inclination of the frame.

The table is flexibly supported on the horizontal flexible blades which are secured to the longitudinal axis of the frame. The flexible blades do away with all machined surfaces and mechanisms that create friction and require lubrication and adjustment of the different parts. The head motion is also advantageously supported on the longitudinal axis of the frame in fixed relation thereto.

While the invention has been described with particular reference to preferred details of construction, it should be understood that it is not to be limited thereto, as many and various changes, alterations and substitutions may be made therein and still fall within its scope and principle; but

What I do claim and desire to secure by Letters Patent is:—

1. In combination in an ore concentrator, a table, a frame member therefor, a transversely disposed base on which the said frame member is mounted to turn on its longitudinal axis, supports for the said base on which it is free to rock on a transverse axis, a vertically adjustable support for the said frame member by which it may be rocked with the base on the said transverse axis, and means for adjusting the said frame member upon the longitudinal axis.

2. In combination in an ore concentrator, a table, a frame member therefor, a transversely disposed base on which the said frame member is mounted to turn on its longitudinal axis, supports for the said base on which it is free to rock on a transverse axis, means for supporting and vertically adjusting one end of said frame member and thereby rocking it with the base, and separate means for adjusting it on its longitudinal axis.

3. In combination in an ore concentrator, a table, a base member mounted to rock on a horizontal axis, a table supporting frame member rotatably mounted on the said base member to turn on an axis transverse to the first said axis and provided with a vertically adjustable support for rocking it with the said base on the first said axis and with another adjustable means for adjusting it on the second said axis.

4. In combination in an ore concentrator, a table, a base member mounted to rock on a horizontal axis, a table supporting frame member rotatably mounted on the said base member to turn on an axis transverse to the first said axis and provided with means for adjusting it separately on the respective axes.

5. In combination in an ore concentrator, a table, a base

member mounted to rock on a horizontal axis, a table supporting frame member rotatably mounted on the said base member to turn on an axis transverse to the first said axis and provided with means for supporting and vertically adjusting the said frame member at another point, and means for adjusting the frame member on the last said axis.

6. In combination in an ore concentrator, a table, a longitudinal frame member, a transverse base in which the said frame member is rotatably secured, said base being supported near its respective ends to rock, a support for the frame remote from the said base, and means for adjusting the frame member in the said base.

7. In combination in an ore concentrator, a longitudinal frame member, a transverse base in which the said frame member is rotatably secured, said base being supported near its respective ends to rock, a support for the frame remote from the said base, and means for adjusting the frame member in the said base, a table movably mounted on the said frame member, and a head motion fixed on the said base for actuating the table.

8. In an ore concentrator, a longitudinal frame member, an end base at one end thereof extending crosswise of the said frame member having revoluble connection therewith, supports on which the said end base is mounted to rock with the endwise inclination of the said frame member, a head motion mounted on the said end base, a table mounted on the said frame member, and means for supporting and vertically adjusting the other end of the said frame member.

9. In an ore concentrator, a base, a frame member, one end of which is revolubly secured at right angles to said base, means for pivotally supporting said base, a cam supporting the other end of said member, a bearing pivotally supporting said cam, flexible blades secured to said frame member, a table secured to said flexible blades, means secured to one end of said member for reciprocating said table, means for adjusting said member in a longitudinal direction by said cam, and means independent of said supports for revolving said member.

10. In an ore concentrator, a longitudinal frame member, flexible blades extending laterally therefrom, a table mounted thereon, a base for one end of said frame member extending laterally therefrom and to which the said member is revolubly secured, vertically adjustable means for supporting the other end of the said frame member, and means for turning it on said base.

11. In an ore concentrator, a table, a frame comprising a longitudinally disposed member beneath said table, and horizontally disposed flexible blades connected at each end to said table and to the longitudinally disposed member of said frame at the middle of said flexible blades.

12. In an ore concentrator, a frame supported upon a foundation about three points, blades secured at the middle to said frame, and a table movably supported by said blades on the ends thereof.

13. In an ore concentrator, a T-shaped frame composed of two members movably secured together, blades secured at the middle to one member of said frame, and a table movably supported by said blades on the ends thereof.

14. In an ore concentrator, the combination of a table, a central longitudinal frame member arranged beneath said table, and horizontally disposed transverse flexible supports secured at their middle portions at each end of the central frame member, the outer ends of said cross supports being connected to the table, whereby the supports are capable of being flexed about vertical axes when the table is moved longitudinally.

15. In an ore concentrator, the combination of a table, a central longitudinal frame member arranged beneath said table, and horizontally disposed transverse flexible cross supports secured at their middle portion at each end of the central frame member, and upright connections at each end of the cross supports connected to the table for supporting the bottom of the table above the cross supports.

16. In an ore concentrator, the combination of a table, a central longitudinal frame member arranged beneath said table, and horizontally disposed transverse flexible supports secured along the length of said central frame member and extending outwardly therefrom at each side, the outer free ends of said cross supports being connected to the table, whereby the supports are capable of being flexed about vertical axes when the table is moved longitudinally.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FRANK E. SHEPARD.

Witnesses:
LYMAN P. HAMMOND,
FRANK A. LOCKWOOD.