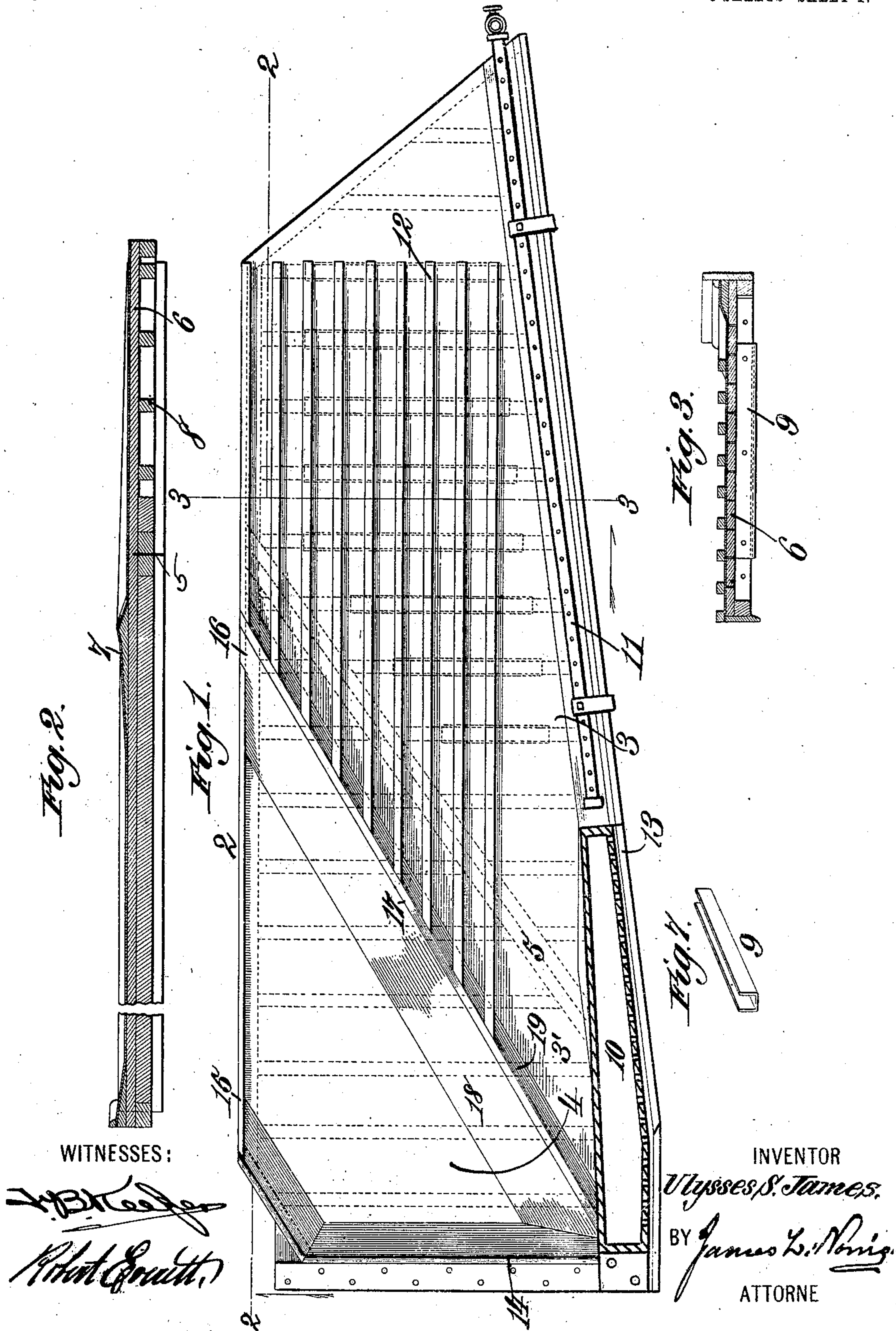


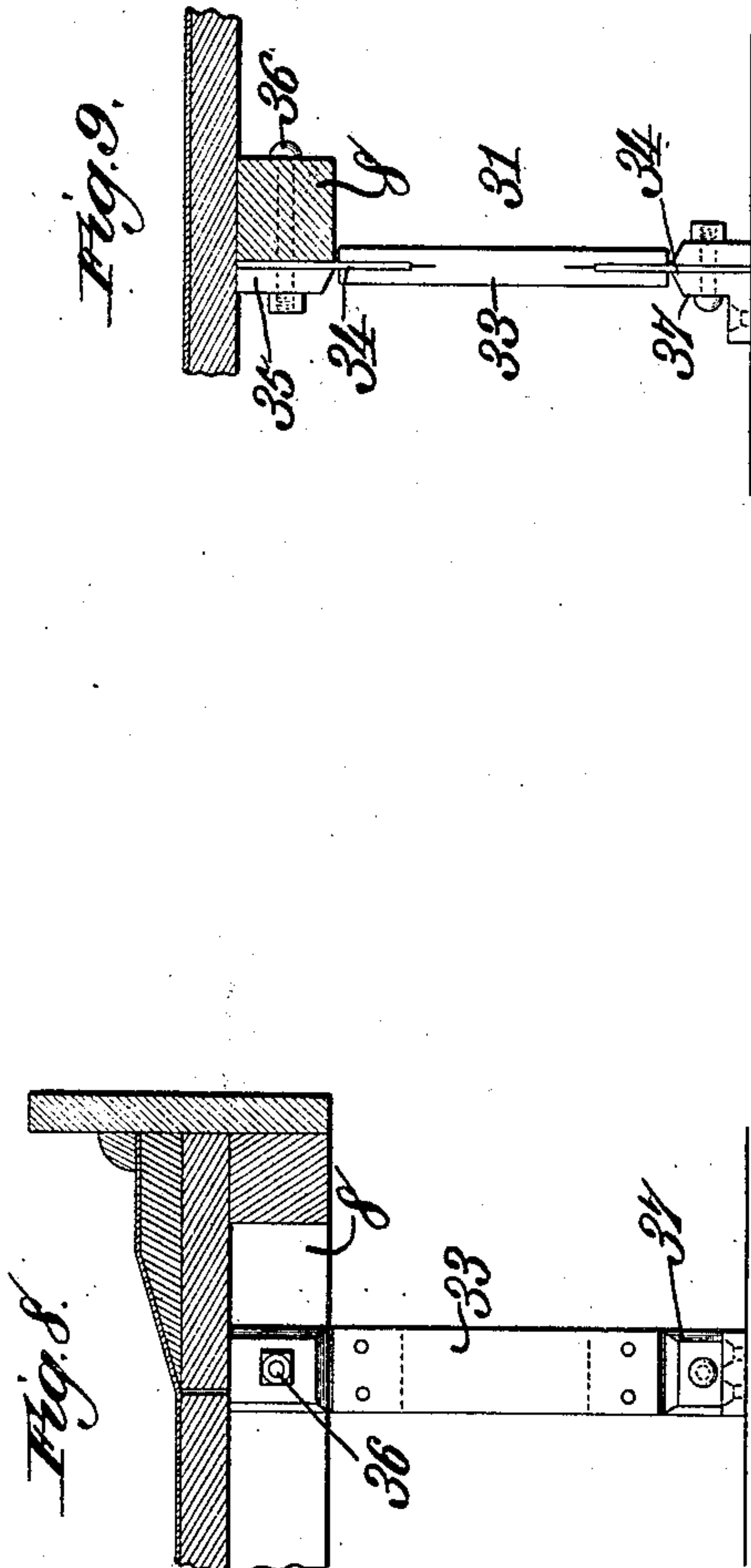
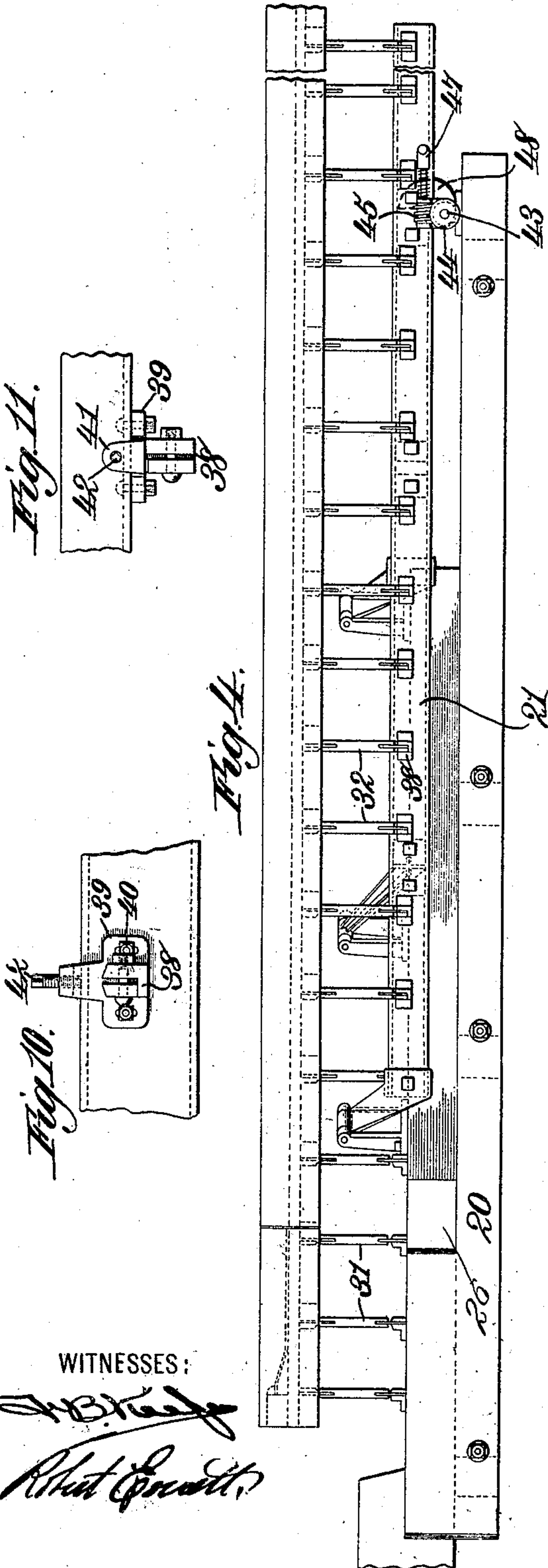
U. S. JAMES.
ORE CONCENTRATOR.
APPLICATION FILED MAR. 26, 1906.

3 SHEETS—SHEET 1.



U. S. JAMES.
ORE CONCENTRATOR.
APPLICATION FILED MAR. 26, 1906.

3 SHEETS—SHEET 2.



WITNESSES:

W. B. Keefe
Robert C. Smith

INVENTOR

Ulysses S. James

BY

James L. Norris

ATTORNEY

No. 874,364.

PATENTED DEC. 17, 1907.

U. S. JAMES.
ORE CONCENTRATOR.
APPLICATION FILED MAR. 26, 1906.

3 SHEETS—SHEET 3.

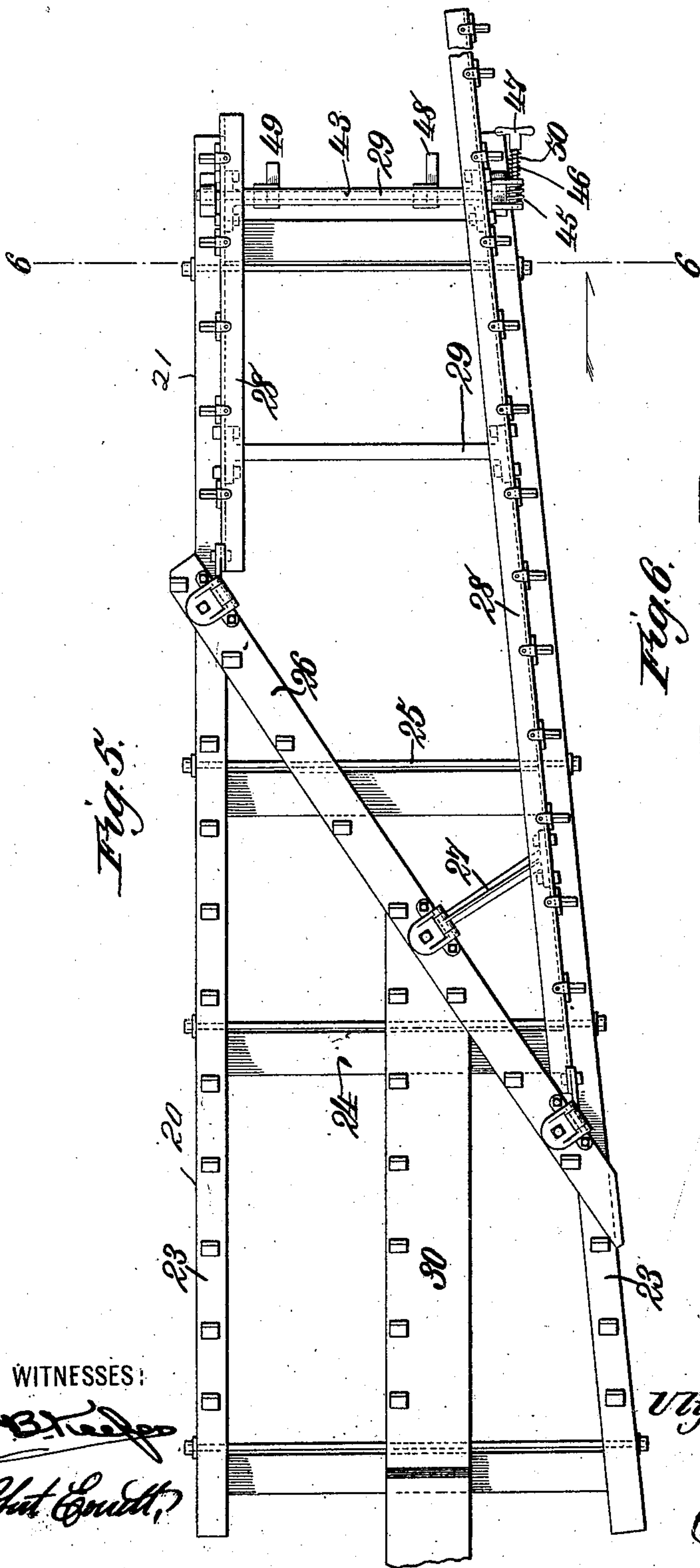


Fig. 5.

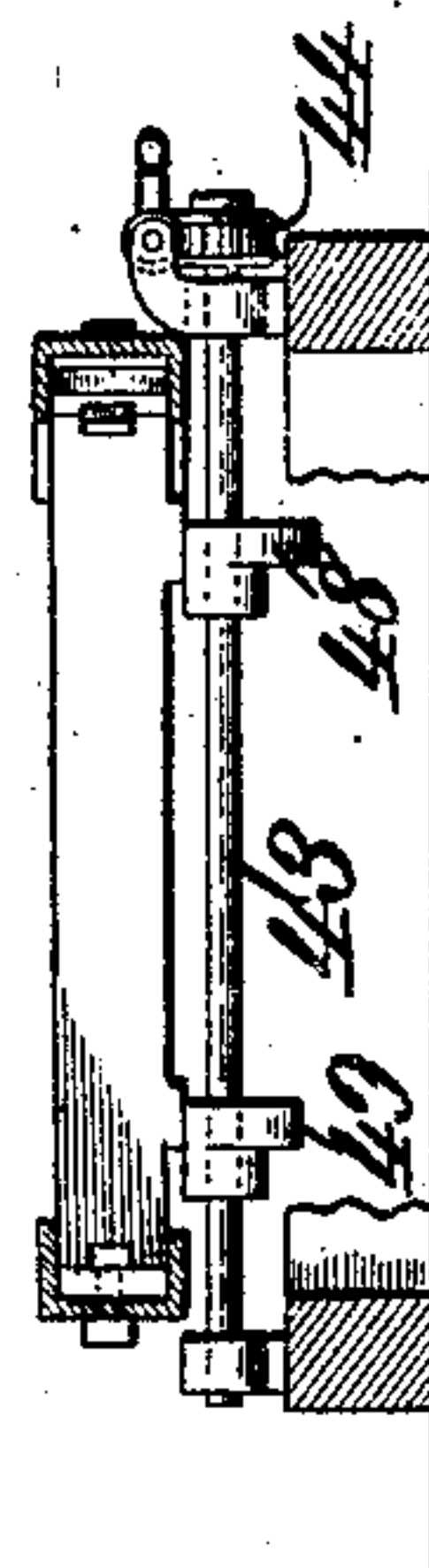


Fig. 6.

WITNESSES:

W. B. Keefe
Robert Condit

INVENTOR

Ulysses S. James

BY

James E. Norris
ATTORNEY

UNITED STATES PATENT OFFICE.

ULYSSES S. JAMES, OF NEWARK, NEW JERSEY, ASSIGNOR TO JAMES ORE CONCENTRATOR CO., OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ORE-CONCENTRATOR.

No. 874,364.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed March 26, 1906. Serial No. 308,069.

To all whom it may concern:

Be it known that I, ULYSSES S. JAMES, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Ore-Concentrators, of which the following is a specification.

This invention relates to ore concentrators.

The present invention is of the same general type as that disclosed in my pending application, Serial Number 263,064, filed May 31, 1905. The present concentrator possesses all the advantages possessed by that covered in said application.

An ore concentrator made in accordance with my invention involves a longitudinally or endwise reciprocatory table. This table is made up of two sections, one of which is the concentrating portion proper, while the other of which constitutes a slime pan. There is some concentration done on or in the slime portion or pan, but the major part of the concentration is performed upon said concentrating portion, for which reason such designation has been adopted. By virtue of the slime portion I am enabled to save mineral values in the slime delivered into or onto said slime portion, a proceeding which has heretofore, so far as I am aware not been possible. The gangue or refuse matter is discharged over one edge of the concentrating portion of the table, while the concentrates saved from the slimes are discharged over such edge immediately back of the place of discharge of the gangue.

I have briefly alluded to the construction of a table embracing my invention. In the drawings accompanying and forming part of this specification, I show one simple adaptation of said table, which to enable those skilled in the art to practice said invention, I will set forth in detail in the following description, while the novelty of said invention will be included in the claims succeeding said description. The table is of such character that it is not subject to vertical vibration; it and the parts upon which the table is mounted are strongly braced.

The invention has other objects and advantages which with the foregoing will be hereinafter treated at length.

Referring to the drawings, Figure 1 is a top plan view of an ore concentrator involving my invention. Fig. 2 is a longitudinal sectional view of the same, the section being

on the line 2—2 of Fig. 1. Fig. 3 is a transverse sectional view, the section being on the line 3—3 of said Fig. 1. Fig. 4 is a side elevation of the table. Fig. 5 is a top plan view of a supporting frame. Fig. 6 is a transverse sectional view on the line 6—6 of Fig. 5. Fig. 7 is a detail view in perspective of a reinforcing or stiffening member. Fig. 8 is a sectional elevation showing part of the table and a supporting member. Fig. 9 is a view of the parts shown in the preceding figure, the section in Fig. 9 being in a plane at right angles to that of Fig. 8. Figs. 10 and 11 are face and top plan views of a bracket, hereinafter more particularly described and showing also a portion of a bed.

Similar numerals refer to like parts throughout the several figures.

My improved concentrator involves a suitable table upon which the concentrating is done. I have shown an advantageous form of table in the drawings, the same being denoted in a general way by 2. In the present case the table consists of two sections as 3 and 4. As the greater part of the concentration of the ore is performed upon the portion 3 of the table, I will designate the same as a concentrating portion, although from what has been hereinbefore stated it will be understood that the slimes are profitably worked over or concentrated upon the slime portion 4. The two sections are connected in a flexible manner, the hinge lying between the two being denoted in a general way by 5 and as represented best in Fig. 1, said hinge or dividing line is oblique to the line of motion of the table, such line of motion being longitudinal. I have not shown any means for longitudinally reciprocating the table 2 for the same constitutes no part of the present invention. This particular mechanism may be of any desirable kind and may be of substantially the same type as that now generally in use which is adapted to give to the table initially on its forward stroke a slow movement, and finally, or on the completion of such stroke, an accelerated motion to drive the mass on the table forward. On the return stroke of the table such mechanism will cause first a rapid and then a slow motion of the table so that the mass on the table will be retained in its advanced position.

The table as shown best in Fig. 2 includes in its make-up a series of longitudinally ex-

tending slats as 6 covered with some suitable material as 7 upon which the concentrating is done. The material 7 may be, for example, linoleum. The longitudinally extending slats 6 are crossed on their under sides by cross bars as 8, the slats and cross bars being usually made of wood, whereby the table can be made inexpensively while it is sufficiently strong and stable to withstand the hard usage to which a table is put. Some of the cross bars 8, as clearly shown in Fig. 1, are intersected by the hinge or dividing line 5. Those cross bars 8 which are located directly under or form part of the concentrating portion 3 of the table are subjected to unusual stress which tends to distort or break the same. To prevent distortion of these particular cross bars, I provide stiffening or reinforcing members in connection therewith, and these stiffening or reinforcing members may be of any desirable character, although they are shown as being of channel form as indicated in Fig. 7. The reinforcing members 9 may consist of sheet metal properly shaped, or they may be in the form of castings to closely fit the cooperating cross bars and to be united thereto in any desirable manner. They may be held in place by a driving fit or by friction or positive means may be provided for holding them in assembled relation.

That part of the concentrating portion 3 of the table to the right of the hinge line 5 in Fig. 1 is upwardly inclined from said hinge line and the latter constitutes the base for said upwardly inclined or concentrating portion. In addition to this upward inclination of the concentrating portion, the latter is also oblique to the line of motion of the table. The angularity of such concentrating portion may be varied to adapt the table to the particular character of ore being worked and I will hereinafter describe a simple means for securing this adjustment.

The feed box for supplying pulp onto the table may be of any desirable character and may be mounted in any suitable way. For this purpose, I have shown a feed box 10 as fastened in some convenient way to the slime portion or pan of the table, and as crossing the hinge line between said slime portion and the concentrating portion of the table, whereby the pulp is delivered directly onto the head end of the table so that when it strikes the table it can be advanced therealong and can be also stratified, the mineral values in the mass which are the heavier settling to the bottom of the mass or directly onto the top 7 of the table. The slimes are carried into the slime pan 4 by reason of their semi-fluid condition assisted by the wash water.

The pulp is introduced onto the head end of the table or substantially thereat at the junction between the two portions of the

table. When the table is vibrated the mass of pulp thereon will become stratified, the heaviest particles being at the bottom of the pulp and the others being in superposed order in accordance with the specific gravities of the particles forming them, the gangue being on top. On the movement of the table, the pulp is advanced toward the tail thereof and the several constituents in which the pulp has been separated are moved crosswise of the table or toward the front thereof, the gangue moving more rapidly than the other materials. The gangue is, therefore, carried toward the front edge of the table and is discharged thereover between the dividing or hinge line 5 and the tail of the table. The mineral values are carried toward the tail of the table with less lateral movement than the gangue, owing to their greater density and are discharged over the front of the table and over the tail end thereof.

The wash water is supplied to the table along a line oblique to the line of motion thereof and any suitable means may be provided for this purpose. For furnishing the wash water I represent a pipe 11 extending along the angular portion of the upper or rear edge of the table which angular edge as shown in Fig. 1 is at an acute angle to the hinge line 5. Extending longitudinally of the table are parallel riffles as 12 which cross the hinge line 5. These riffles extend in the direction of line of motion of the table and are comparatively shallow so as not to retard the lateral motion of the gangue after the same has been separated from the mineral values.

Along the rear of the table is extended a ledge as 13 which connects with the ledge or flange 14 extending across the head end of the table, the flange 14 having its front end deflected upon a forward angle and extending into the ledge or flange 15 running along the slime portion of the table. The free end of this ledge or flange 15 extends short of the slime portion so as to provide an outlet as 16 for the mineral values concentrated from the slimes which particular mineral values are discharged over the front of the table immediately behind the gangue, the gangue being delivered over the front of the table at a point commencing with the dividing line 5 and ending at a point between the same and the tail of the table. Extending across the table diagonally thereof is a ridge as 17 located in the present instance upon the slime portion 4. This ridge 17 extends approximately from the rear head corner of the table to the front edge thereof substantially centrally of the length of said front edge and near the hinge line 5. The ridge 17 with the flanges 14 and 15 present the marginal portion of the slime pan which has the outlet 16. The ridge 17 has oppositely inclined faces as

18 and 19 both diagonal to the line of motion of the table. The face 18 constitutes really the concentrating or effective part of the slime pan and is wider than the face 19; it extends upward toward the apex of the ridge 17, while the face 19 extends downward from said ridge. This ridge 17 prevents the coarse material from entering the slime pan although it does not prevent the slimes from entering said pan owing to their character. The upper surface of the ridge or flange 15, which in the present case is horizontally disposed, merges into the inclined face 18 as clearly indicated in Figs. 1 and 2. The wash water and the water in the slimes contained within the slime pan 4 is in a quiet or still condition so as not to offer any resistance to the flow of the slimes into said slime pan.

When the slimes enter the slime pan the mineral values therein gravitate toward the bottom of the liquid and on the forward motion of the table are projected onto the inclined surface 18. The ridge 17, however, of which said inclined surface forms a part, prevents the mineral values which have descended in the slimes from being washed over the top of the ridge and this result is aided by the wash water flowing over the top of the ridge. The mineral values in the slimes are after precipitation projected on the forward motion of the table onto the inclined surface and are not carried thereover as previously set forth, but they are moved along said inclined surface and are directed through the outlet 16. The wash water free of mineral values and mixed with tailings or refuse from the slime pan passes over the front ledge 15. By the provision of the slime pan I am enabled to save mineral values in slimes which have not heretofore been saved with concentrating tables as ordinarily constructed.

The framing for supporting the table 2 may be of any desirable character, although in Figs. 4 and 5 I have represented an advantageous form of framing and the same involves in its make up a stationary member denoted in a general way by 20 and a swinging-member as 21, the swinging member being hingedly mounted and being directly associated with the concentrating portion 3 of the table by virtue of which the angular adjustment of said concentrating portion may be readily obtained. The portion 20, as best shown in Fig. 5, comprises two stringers, each denoted by 23, which converge toward the tail of the table. These stringers are prevented from inward motion by the cross beams 24 fitted between and suitably secured to the same, while outward motion of the two stringers is prevented by the tie rods or bolts 25 of any desirable number. The two stringers 23 are cut away between their ends as shown for example in

Fig. 4 and the diagonally disposed strut or brace 26 rests on the top of the cut away portions and bears near its opposite ends near the forward ends of shoulders produced by said cut away portions. The upper face of the brace or strut 26 is flush with or in the same horizontal plane as the upper surface of the deeper parts of the two stringers. (See Fig. 4). This brace extends in the direction of the hinge line 5 and is located immediately under said line so as to prevent the table tipping in the direction of the said line. In addition to this the brace also strengthens the bed or foundation frame and provides a means for upholding certain links. The hinges, each designated by 27, are also sustained by this brace 26, the hinges uniting the two sections of the frame or bed of the table. The axes of the several hinges 27 are alined and are in a vertical plane intersecting the hinge line 5. The hinge member 21 of the bed or foundation frame, is shown as composed of two steel or other metallic bars, each designated by 28 and which extend in the same general direction as the stringers 23, as illustrated in Fig. 5. Between the two bars or channel irons 28 the cross braces 29 extend, said cross braces having heads at their opposite ends fitted within the channels of said bars 28 and bolted or otherwise suitably fastened to the webs thereof. These cross braces or bars 29 prevent lateral motion both inwardly and outwardly of the two bars or channel irons 28. On the upper side of the two cross pieces 24 at the left in Fig. 5 rests and is suitably fastened a beam 30, the upper face of which is in the same horizontal plane as the upper face of the obliquely disposed brace or strut 26, the two parts last mentioned abutting against each other in order to further strengthen the structure.

I flexibly support the table 2 in an advantageous manner so that it will not be susceptible to shocks or jars, but on the contrary will run smoothly and noiselessly. This result I accomplish by links of a novel character extending between the table and the bed or foundation piece for the table which, as will be understood, comprises stationary and hinged sections as 20 and 21, respectively. There are two series of these links, one series extending between the stationary member 20 and the table, and I will designate each in a general way by 31, while the other series, each of which I will designate in a general way by 32, extends between the swinging member 21 and said table. All of the links are of the same general character so that a detailed description of one will suffice for the remainder, and in this connection particular reference may be had to Figs. 8 and 9, wherein one of the links which extends between the member 20 and the table is shown in detail. In these two figures, I have shown a way of connecting the links with the respec-

tive parts. The links shown in these two figures involve a body portion as 33 made of some suitable stiff material as wood to prevent upward displacement of the table and flexible strips as 34 extending from the opposite ends of said wooden body. These flexible strips 34 may be of any suitable material, rubber belting so known being quite suitable for the purpose. The strips 34 are set into notches or slots in the opposite ends of the wooden body and are fastened to the latter in some suitable way as by rivets. The upper flexible strips 34 are fitted flatwise against one of the side faces of the respective cross bars 8 and laid against the flexible strips are facing pieces as 35 of wood for example, bolts 36 serving as a suitable means connecting the facing members 35, upper flexible strips 34, and cross bars 8. The lower strips 34 are fitted between the sections of clamps as 37, the sections of which are held together by bolts or any other suitable manner, and one section of each of which clamps is fastened to the sections of the stationary bed or foundation member 20.

With respect to the series of links 32 they are connected at their upper ends with the angularly adjustable or concentrating portion of the table 2 exactly as are the upper ends of the links 31 connected with the slime portion of the table. The links 32, however, are connected at their lower ends adjustably with the swinging section 21 so that should there be any imperfection in the irons 28, such imperfections will not prevent the concentrating portion of the table from being brought to an absolutely horizontal position when the table as a whole is set up. The lower flexible strips 34 of the links 32 are held in place by clamps as 38 forming parts of brackets as 39 supported for vertical adjustment by the sides of the swinging member 21. In the bodies of the several brackets 39 are formed vertically disposed longitudinal slots through which screws as 40 are passed (see Figs. 10 and 11) by which vertical adjustment of the several brackets can be obtained, this being accomplished by loosening up the screws. After the adjustment is secured it can be maintained by tightening up the screws. To facilitate the elevation of the respective brackets they may be provided, as shown in Fig. 11, with heads as 41 which overhang the upper edges of the sides of said member 21, and through which are tapped adjusting screws as 42 to engage said sides.

Any desirable means may be employed for elevating or lowering the swinging section 21 thereby to regulate the angular position of the concentrating portion 3 through the intervention of the intermediate links 32 as will now appear. Supported by suitable bearings upon the stringers 23 near the tail

end of the table is a shaft as 43 having at one end thereof a worm-gear as 44 meshing with a worm as 45 on the shaft 46, said shaft being provided with a head as 47 at one end, as shown in Figs. 4 and 5. By turning the head 47, the shaft 46 and consequently the shaft 43, through the intermediate worm gearing described, can be turned so as to carry cams as 48 and 49 against the outer cross bar 29 to angularly adjust the concentrating portion 3 of the table. The cam 48 has a greater throw than cam 49, as it is necessary to elevate the rear side of the table slightly more than the front side of the table to preserve the obliquity to which I have hereinbefore referred. The shaft 46 is shown as surrounded by a spring 50 bearing at its ends against the head 47 and against the bearing for said shaft, the spring serving to positively prevent backward motion of the two shafts, while the table is in action. Were not the spring present the two shafts would be turned backward while the table is in motion, and thereby affect the adjustment of the concentrating portion thereof.

The table involving my invention comprises really main and auxiliary concentrating portions. Practically the major part of the concentrating is done upon the main portion. In other words, the pulp or heavier material is worked over on this main concentrating portion, while the finer particles making up the slimes are worked on the auxiliary portion. Both portions of the table, therefore, are simultaneous in action. The main or concentrating portion 3 of the table has between the ridge 17 and the hinge line 5 a horizontal portion 3', as shown clearly in Fig. 1 on which the material when it is first delivered onto the table can freely spread out, this insuring the clean separation of the gangue from the mineral values.

What I claim is:

1. An endwise reciprocatory ore concentrating table having a concentrating portion flexibly joined along a line diagonal to the line of motion of the table and a slime portion, the concentrating portion being adapted to concentrate the pulp and the slime portion being adapted to receive the slime from the pulp and having an inclined ledge extending obliquely thereacross, provided with a face inclined upward toward the tail of the table and oblique to the line of motion thereof combined with means for adjusting said concentrating portion angularly with respect to the slime portion.

2. An endwise reciprocatory ore concentrating table having a concentrating portion flexibly joined along a line diagonal to the line of motion of the table and a slime portion, the concentrating portion being adapted to concentrate the pulp and the slime portion being adapted to receive the slimes, said

slime portion having a ridge extending angularly across the same, said ridge having an inclined face oblique to the line of motion and upwardly inclined toward the tail of the table, said slime portion also having means to hold the wash water supplied thereto substantially in a quiet condition combined with means for angularly adjusting said concentrating portion with respect to the slime portion.

3. An ore concentrating table having a concentrating portion and a slime portion, the concentrating portion being adapted to concentrate the pulp and the slime portion to concentrate the slimes, said slime portion having a ridge extending angularly across the same provided with an inclined face oblique to the line of motion of the table and upwardly inclined toward the tail of said table, said slime portion having flanges extending along the head and front thereof, the front flange merging into said inclined face and extending short of the apex of the same to provide an outlet for mineral values between said front flange and the apex of said inclined face.

4. The combination of a supporting bed involving a stationary and a swinging member, a concentrating table involving two flexibly related sections, and supporting links connected flexibly with the sections of the supporting bed and with the sections of the table.

5. The combination of a supporting bed involving a stationary and a swinging section, a concentrating table comprising flexibly related sections, and supporting links extending between the sections of the table and the sections of the supporting bed.

6. The combination of a supporting bed involving a stationary and a swinging member, a concentrating table involving two flexibly related sections, supporting links extending between one of the sections of the table and said swinging member, and supporting links extending between the other section of the table and the stationary mem-

ber and adjustably connected with the latter.

7. The combination of a bed or foundation member composed of a stationary part and a swinging part, links composed of stiff bodies and flexible strips extending oppositely therefrom, the lower strips being connected with said stationary part, other links also composed of stiff bodies provided with flexible strips at opposite ends of the same, the lower strips being adjustably connected to said swinging part, and a table composed of flexibly related sections connected respectively with the two upper series of flexible strips.

8. The combination of a bed or foundation member composed of a stationary part and a swinging part, links composed of stiff bodies and flexible strips extending oppositely therefrom, the lower strips being connected with said stationary part, other links also composed of stiff bodies provided with flexible strips at opposite ends of the same, the lower strips being adjustably connected to said swinging part, hand operated mechanism for raising and lowering said swinging part and a table composed of flexibly related sections connected respectively with the upper series of flexible strips.

9. The combination of a bed or foundation piece consisting of a stationary part and a swinging part, a table composed of flexibly related sections, supporting links connected with the sections of the table and with the parts of said bed or foundation member, a shaft provided with cams, having different throws, to actuate said swinging part, and hand operated mechanism for turning said shaft.

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

ULYSSES S. JAMES.

Witnesses:

CHAS. S. HYER,
HEATH SUTHERLAND.