

F. FRANZ.
ORE CONCENTRATOR.

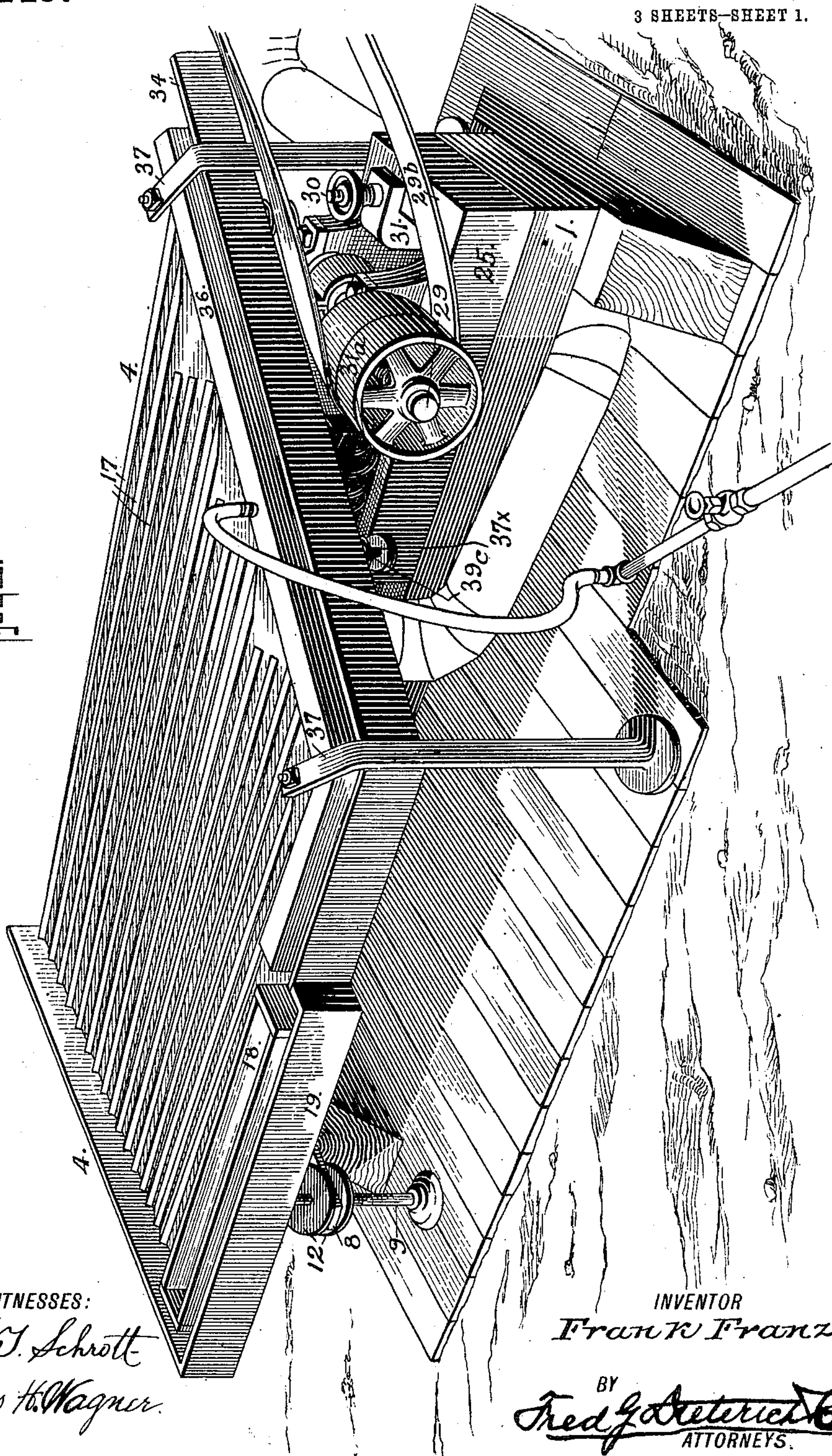
APPLICATION FILED OCT. 27, 1909. RENEWED MAR. 28, 1911.

995,449.

Patented June 20, 1911.

3 SHEETS—SHEET 1.

Fig. 1.



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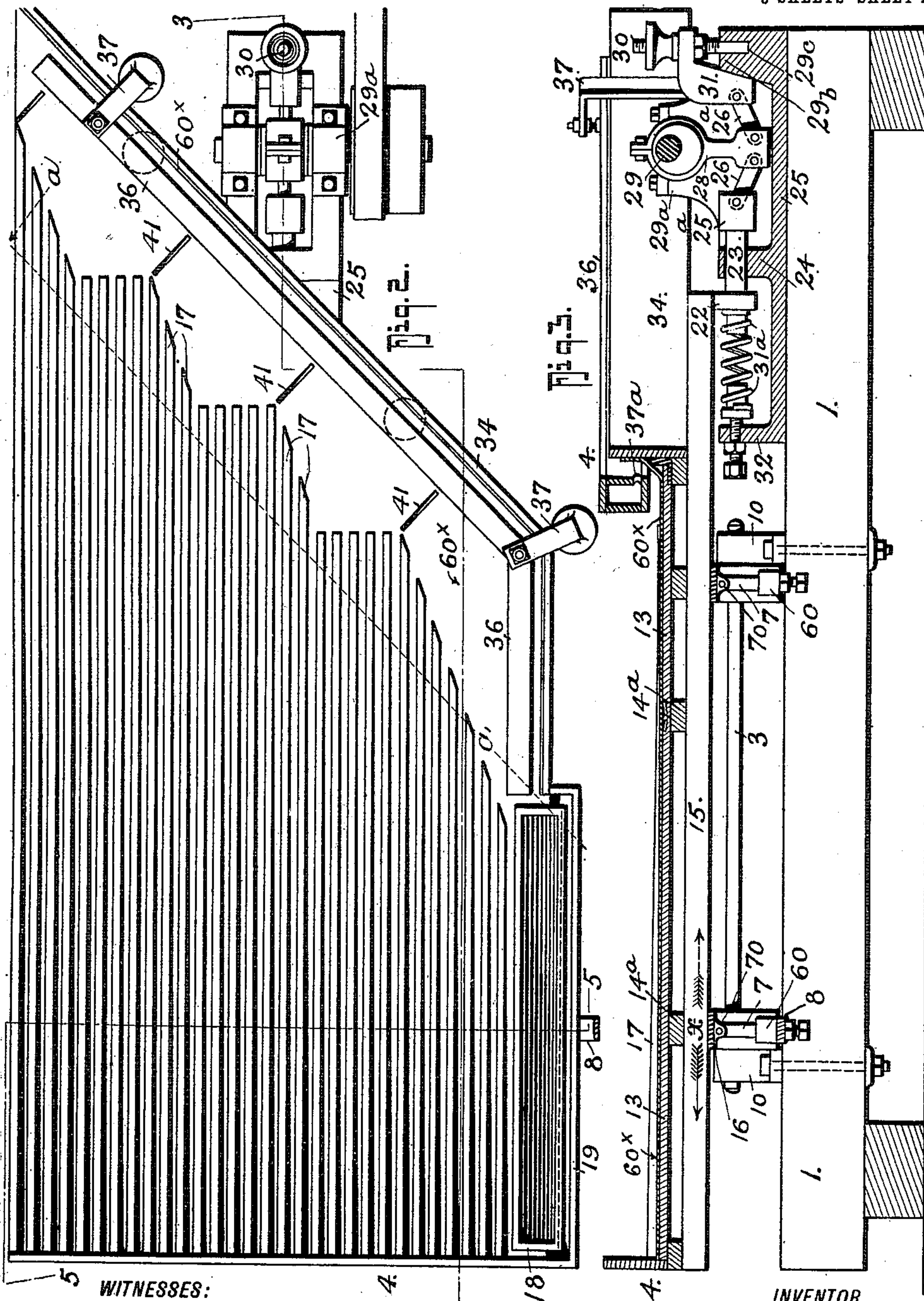
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3 SHEETS-SHEET 2.



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3 SHEETS-SHEET 3.

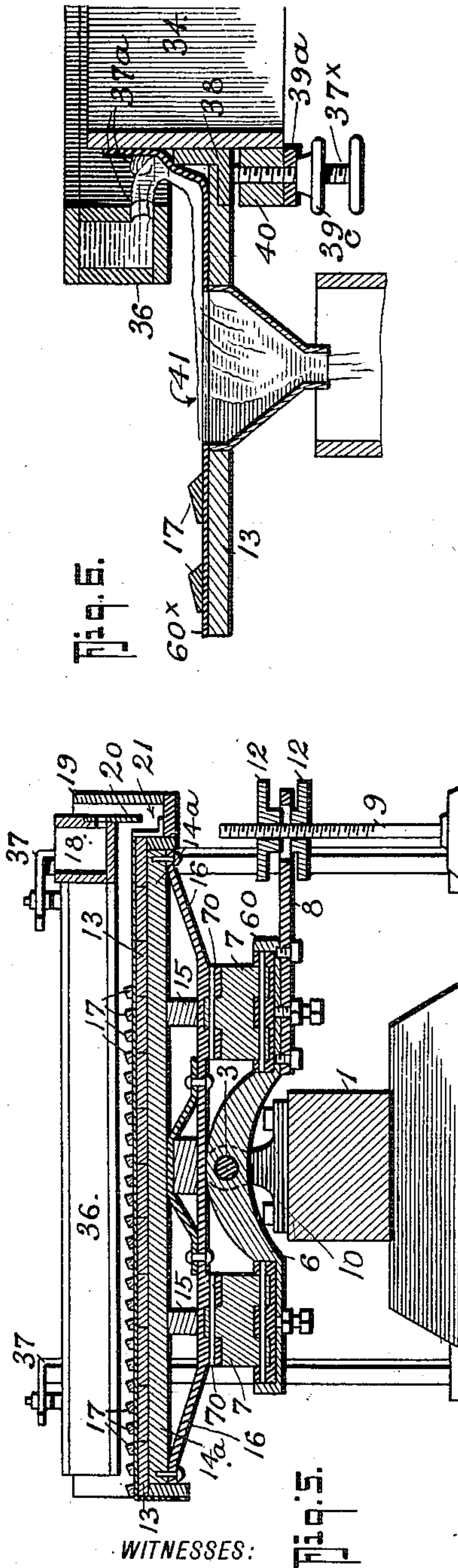


Fig. 5.

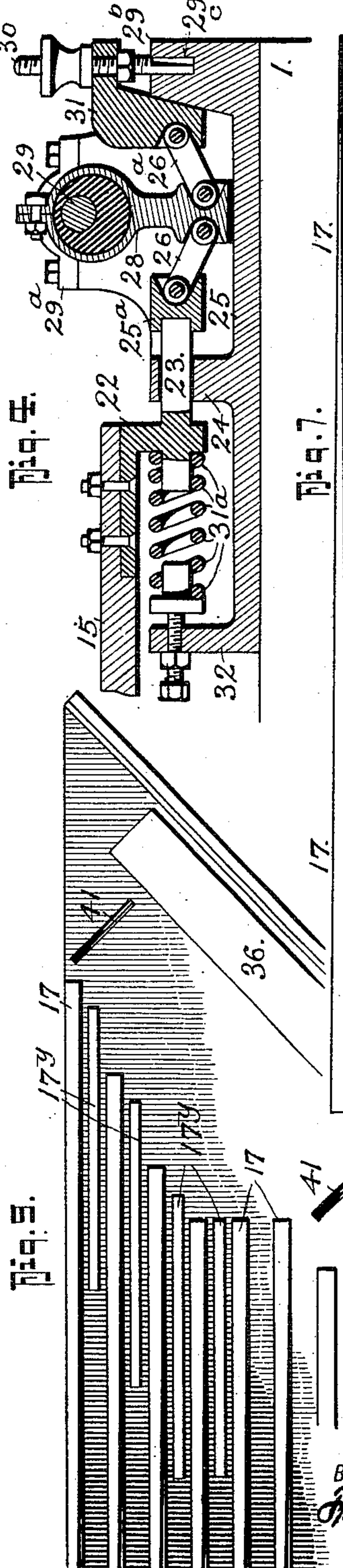


Fig. 6.

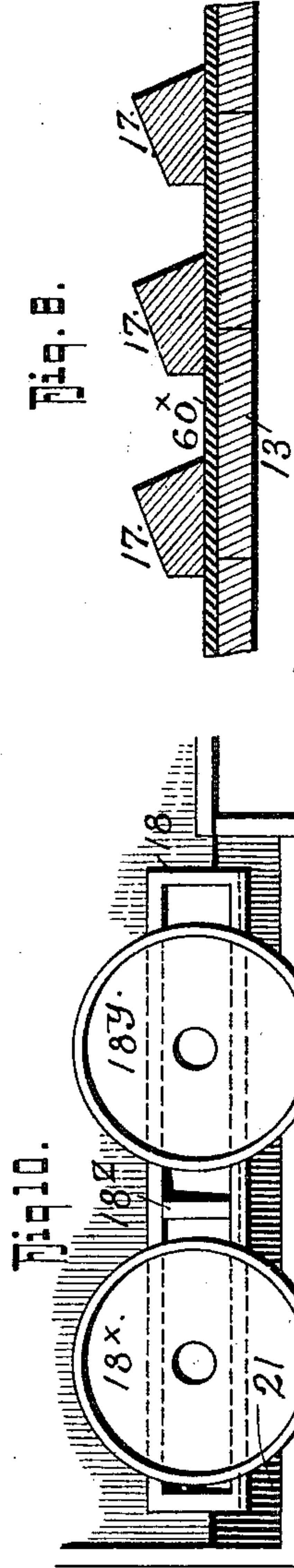


Fig. 7.

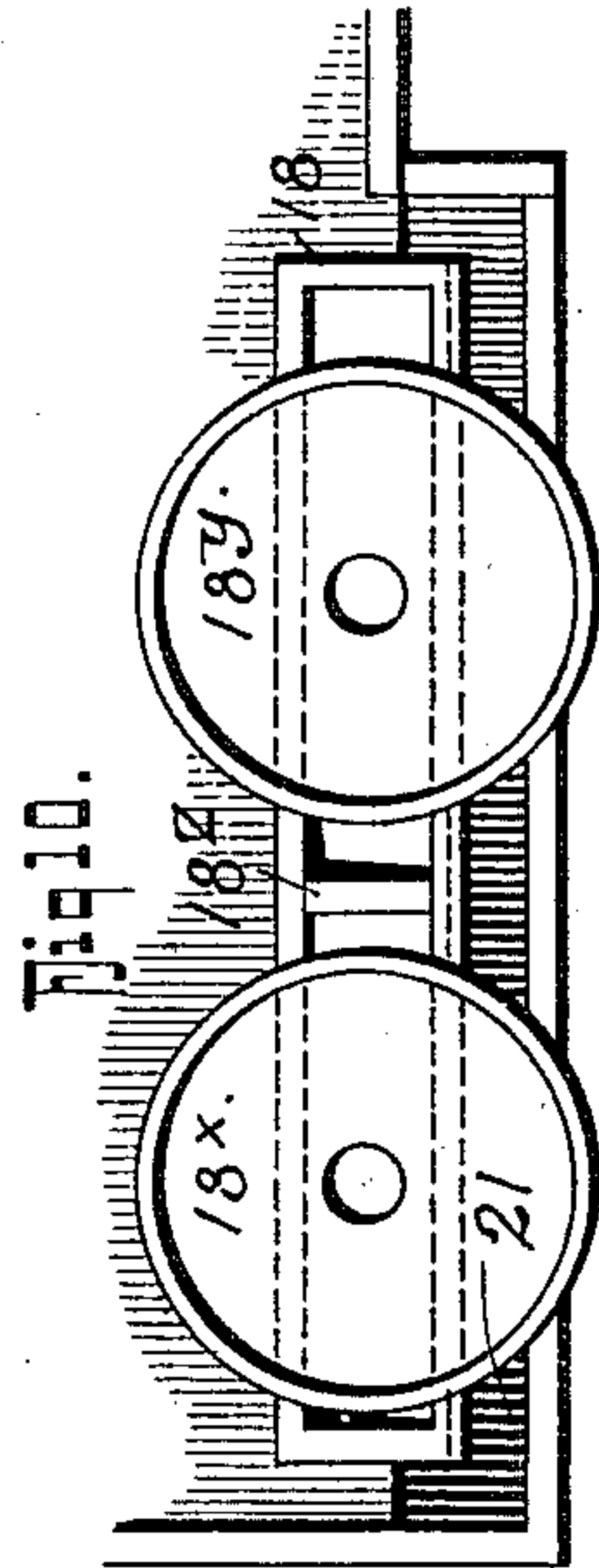


Fig. 8.

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ORE-CONCENTRATOR.

995,449.

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To all whom it may concern:

Be it known that I, FRANK FRANZ, residing at Burke, in the county of Shoshone and State of Idaho, have invented a new and

Improved Ore-Concentrator, of which the following is a specification.

My invention relates to improvements in ore concentrators, and more particularly to that class of concentrators known as "slime concentrators" and it primarily has for its object to provide a concentrator of the general type stated, of a simple, compact and economical nature in which the parts are especially designed and arranged for so catching and treating the mineral as it passes through the concentrator that a substantially perfect separation of gangue from the largest as well as the finest mineral products is rapidly and positively effected.

In its generic nature, my invention comprehends an improved construction of concentrating table or deck, provided with longitudinally arranged riffles extending to near the tail end or concentrates discharging end of the deck, and coöperatively combined with means for flexing or inclining the said tail of the deck with respect to the discharging ends of the riffles whereby to retard the discharge of the mixed material, and hold the same as it is subjected to a final washing.

In its more complete nature, my invention embodies a table or deck, a washing means at the tail end, means for flexing said tail end vertically, and a series of riffles that extend longitudinally of the deck and of gradually increasing flexibility toward the tail end.

My invention also comprehends a longitudinally riffled concentrating deck or table, adapted for carrying the material forward to the tail end, combined with means for simultaneously producing an abrupt movement thereof in the longitudinal direction and rocking it in the said direction.

In its still more subordinate features, my invention consists in the details of construction and peculiar combination of parts, all of which will be hereinafter fully described, specifically pointed out in the appended claims, and illustrated in the accompanying drawings, in which:—

Figure 1, is a perspective view that shows the general arrangement of my improved construction of concentrator. Fig. 2, is a

plan view thereof. Fig. 3, is a longitudinal section thereof, taken substantially on the line 3—3 on Fig. 2. Fig. 4, is a longitudinal section on an enlarged scale, illustrating the "knocking" devices for imparting the abrupt longitudinal motion to table. Fig. 5, is a cross section, taken on the line 5—5 on Fig. 2. Fig. 6, is a detail section that shows one of the deck flexing adjusting screw devices, and Fig. 7, is a side elevation of one of the tapering riffles. Fig. 8, is an enlarged cross section of several riffles. Fig. 9, is a modified form hereinafter referred to. Fig. 10, is a modification also hereinafter described.

In carrying out my invention, I support the concentrator on a longitudinally disposed base timber 1 upon which, and in longitudinal alinement, are mounted two bearing castings 10—10 in which is mounted a rod or shaft 3 upon which the concentrator table or deck 4 is rockably supported to tilt transversely and rock in the longitudinal direction, in the manner best shown in Figs. 2 to 5, by reference to which it will be seen two arched saddles 6—6 are rockably mounted on the rod and are transversely disposed relatively to the table 4, their outer ends having socketed bearings 60—60 to receive the lower ends of toggle members 7—7, the upper ends of which are pivotally joined with the under side of the table as at 70—70 so that when the table is reciprocated longitudinally, the toggles will swing in the directions indicated by the arrows *x—x* on Fig. 3 and thereby impart a slight longitudinal and vertically rocking motion to the table as will hereinafter be further referred to.

To one end of one of the saddles 6—6 is fastened a laterally projected arm 8 apertured to move freely on the threaded end of a standard 9 that carries two adjusting nuts 12—12, one above the other below the arm 8, it being obvious that by adjusting the nuts 12—12 the arm 8 can be raised or lowered to tilt the table laterally to the degree or position desired.

The table or deck 13 comprises a bottom mounted on transverse timbers 14^a—14^a in turn secured to a number of longitudinal beams 15—15 braced by truss members 16—16 that rest upon the upper ends of the toggles 7—7 as clearly shown in Fig. 5, by reference to which and to Fig. 2 it will be

also noticed that on the deck or table is mounted a series of longitudinally disposed riffles 17—17 whose cross sectional shape is such as to retard the inflowing material in its transverse direction over the deck as it passes from the feed box 18 located at one side of the table adjacent the front vertical wall 19 thereof, said feed box being mounted above the infeed side of the riffled surface to discharge between the riffle side and the wall 19, and to provide for positively submerging all the mineral under the water before it can pass onto the table or deck, a baffle plate 20 is secured to the outer wall of box 18 that extends down to a point below the riffles, as clearly shown in Fig. 5.

So far, it will be apparent by reason of the construction described, the material as it passes from box 18 is directed down into a well or trough like portion 21 of the deck and precipitated by the baffle plate to a point below the riffles, and the said material after passing under the baffle 19 flows onto the riffles, and by reason of a slight tilt of the table, has a tendency to move transversely over the riffled surface toward the other side, being constantly retarded in such direction to cause the heavier particles to be precipitated and arrested by the riffles. The gangue or slimy stuff and the precipitates are gradually caused to work toward the tail end of the concentrator by imparting constant shock or jars on the table in the longitudinal directions and to facilitate such operation, as well as effect a most thorough agitation of the material being separated, I have provided for imparting a longitudinally rocking motion to the table as it is constantly jarred, the toggle link supports therefor heretofore described and best shown in Fig. 3 serving for such movement.

For reciprocating the table in the longitudinal direction, as stated, I have provided the means best shown in Fig. 4 by reference to which it will be seen to the central one of the longitudinal bottom beams of the table and at the tail end is secured a bumper bracket 22 that has a stud bolt 23 which slidably rides in a bracket bearing 24 in a casting 25 mounted on the tail end of beam 1, its outer end having a head 25^a with which rockably engages a toggle link 26, the other end of which pivotally engages a head on a pitman 28 actuated from a drive shaft 29 mounted in bearing boxes 29^a formed on the casting 25, which also has a projection 29^b having a screw socket 29^c to receive an adjusting screw 30 that engages a wedge block 31 which forms a bearing for the toggle member 26^a whose inner end fulcrums on the stud 27 on the pitman.

By providing a wedge block and means for adjusting it with respect to the projection 29^b whose inner face is tapering to coact with the wedge, the pitman stroke is

varied, that is to say, by adjusting the wedge upwardly the extended angle of the toggle members are decreased so far as effecting a pushing action on the stud bolt 23, whereas by adjusting the wedge down to bring the bearing of the toggle 26^a on the wedge more in horizontal alinement with the stud bolt 23, the thrust of the toggles on the bolt 23 will be increased, thus providing for a greater or less longitudinal reciprocable motion on the table as the character of the material being worked may make desirable, it being understood that the wedge toggle and pitman devices described provide for moving the table outwardly only, the inward or come back movement, being a quick one under action of the spring 31^a located between the lug or bearing 24 and an outer lug 32 on the casting 25 which spring is placed under tension as the pitman moves to expand the toggles 26—26^a, it being understood that so soon as the pitman has reached the limit of its toggle expanding stroke, spring tension is released and the table is thrust tailward, quickly and noiselessly, the force of such thrust depending on the tension of the spring which in turn is dependent on the adjustment effected by the wedge devices before referred to.

One of the objectionable features in the use of slime concentrators is the loss of the finer particles at the tail end, especially where final washing is provided for at that end. In my construction the tail end of the concentrator is closed off by the end wall 34 and at a point inside the end wall is mounted a transversely disposed washer box 36 supported on hanger brackets 37—37 that extend up beyond the tail end and extend over the tail end of the table, said box having a number of outlets 37^a that discharge against the end wall as best shown in Fig. 6.

As before stated, in the common run of concentrators that treat slime ores much of the smaller or lighter mineral products pass off with the sand or other waste. In my construction of concentrator, I have especially provided against this loss by arranging the tail end of the deck or table, as best shown in Figs. 1 and 2, by reference to which it will be seen that the riffles do not extend the entire length of the table, leaving, as it were, the tail end smooth. This tail end is, however, flexibly held, at some distance back from the water box on the line *a—^a*, it being hingedly joined to one of the under cross timbers, so that its outer or tail end can be freely elevated toward or lowered from the water box, and for raising or lowering the said tail end of the table one or more adjusting devices is provided one of which is clearly shown in Fig. 6 and consists of a screw 37^x that passes through the front cross timber 40 whose upper end

passes through an angle plate 38 made fast to the outer edge of the table tail end, and which engages a threaded aperture 39 in a plate 39^a in the bottom of the timber 40, said screw having a hand wheel and carrying a jam nut 39^c, the parts being so arranged that by adjusting the screw 37^x the tail end of the table can be flexed up or down and held to its adjusted positions.

To prevent escape of the water and other material between the outer or free end of the hinged table section and the end wall 34 a leather or other yieldable covering 60^x is secured at one end to the wall 34 and at the other end to the table.

It should be here stated that I am also aware that means have been provided in the nature of lift screws for raising the forward or infeed ends of riffled tables to facilitate the working of the material to the tail end of the table. In my construction, the flexing of the table is provided for retarding the movement of the material as it reaches the tail end of the table and to cause the sand and other slimy material to constantly work backwardly or away from the openings 41—41 at the tail end, and that are arranged substantially at right angles to the passage or direction of movement of the slime as it flows from the tail end of the riffles toward the discharging side of the table. The precipitates discharge through the openings but by reason of the inclining of the tail end of the table, as stated, the sand and slimy material is subject to a series of back washes, as it were, before they pass off the table, thereby providing for a maximum separation of the precipitates that escape through the openings 41.

To provide for a maximum separation of the mineral from the gangue caught up by the riffles the table is formed of angular shape in plan view with the long side or angle farthest away from the infeed and for subjecting the caught gangue to a series of washings, the riffles have their tail ends projected over the hinged line of the smooth tail end of the table and the said ends are staggeredly arranged, each set ending partly on an angle that lines toward the outer extremity of the table and with a straight abrupt portion that lines at right angles to the longitudinal axis of the table, and the staggered ends of the riffles extend onto the hinged tail end of the table.

In order that no metals may be lost and to make a thorough washing of the gangue certain, I have placed supplementary and shorter riffles 17^y between the main riffles 17 at the farthest corner of the deck, see Fig. 9, it being understood that by this means finer particles may be gathered, which otherwise would be carried away by the gangue.

Fig. 10 shows a modification of the feed box 18 comprising two hoppers 18^x—18^y one

for coarse material and the other for finer material, a partition 18^z keeping the two different classes of gangue from mixing until it reaches the deck or table 13, thus by feeding heavy ore in the hopper 18^x and lighter ore into 18^y, the heavier will get behind the lighter and so facilitate separation.

To facilitate the working of the caught up gangue toward the tail end, and to provide enough flexibility to the ends of the riffles that lap over the hinged tail end of the table, all of the riffles are tapered as before stated and as clearly shown in Fig. 3.

41 designates the outlets through which the mineral precipitates pass and into suitable receptacles in practice provided to gather them.

From the foregoing, taken in connection with the drawings, it is believed the complete construction, the manner in which my concentrator is used and its advantages will be readily apparent to those skilled in the art to which it appertains.

The essential advantage in the construction shown and described is the provision for retarding the outflow over the smooth part of the table of the finer mineral particles with the sand, and the value of this will be apparent when it is understood that experience has developed that while riffled surfaces are the best means for catching up the gangue, unriffled surfaces are best for effecting the separation of the mineral from the gangue, and since the plain surface, to get the results desired, must be at the tail end, it follows that by retarding the outflow of the sand and slime and subjecting it to a number of rewashes, at the tail end, before it can leave the table, provides for a maximum separation of the mineral from the gangue and practically overcomes the loss of mineral incident in most concentrators of the general type herein referred to and now in use.

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

1. In an ore concentrating machine, a concentrator table, comprising a supporting body, said body having an edge cut on a bevel at one end, a plurality of longitudinally disposed parallel ribs mounted over said supporting body, a yieldable covering for the upper surface of said supporting body, a trap at the infeed end of said table, said table having a smooth unriffled part at the concentrates discharge end, an upwardly projected board at said bevel cut end, said covering lapping up against said last named board, means for discharging water against said lapped portion of said covering.

2. In an ore concentrating machine, a concentrator table, comprising a supporting body, said body having an edge cut on a bevel at one end, a plurality of longitudinally dis-

posed parallel ribs mounted over said supporting body, a yieldable covering for the upper surface of said supporting body, a trap at the infeed end of said table, said table having a smooth unrifled part at the concentrates discharge end, an upwardly projected board at said bevel cut end, said covering lapping up against said last named board, means for discharging water against said lapped portion of said covering, said tail end being vertically adjustable, means for effecting said vertical adjustment, said longitudinal ribs being arranged in sets, certain of said sets having the discharge ends of said ribs cut straight across and the remaining sets having the discharge ends of said ribs cut on a bevel to cause said sets of ribs to effect a staggered relation to one another at the concentrates discharge end of the table, said table having precipitate slots at its discharge end extended at right angles to said bevel cut edge and having one end in close juxtaposition to certain of said ribs.

3. In an ore concentrator table, comprising a supporting body having a bevel cut edge at the concentrates discharge end of the table, said body having a covering and having an upwardly projected wall along three edges, an infeed box at the infeed side of the table and a trap at the infeed side of the table into which the contents of the infeed box discharge and from which said contents flow onto the top of said table, said table having a longitudinally rifled top provided with a smooth concentrates discharge end, said covering at the concentrates discharge end being lapped up against the wall at said bevel cut edge, means for projecting water against said upwardly lapped portion of said covering, and said table having precipitate slots at the concentrates discharge end disposed at right angles to said bevel cut edge.

4. In an ore concentrator table comprising a supporting body having a bevel cut

edge at the concentrates discharge end of the table, said table having a covering and having an upwardly projected wall along three edges, an infeed box at the infeed side of the table and a trap at the infeed side of the table into which the contents of the infeed box discharge and from which said contents flow onto the top of said table, said table having a longitudinally rifled top provided with a smooth concentrates discharge end, said covering at the tail end being lapped up against the wall at said bevel cut edge, means for projecting water against said upwardly lapped portion of said covering, said table having precipitate slots at the concentrates discharge end disposed at right angles to said bevel cut edge, said table support consisting of two sections hinged together on an axis substantially parallel to said bevel cut edge, one of said hinge sections being rigid and the other adjustable, and means for adjusting said adjustable section.

5. In an ore concentrator, a concentrating table having its riffles extended in a direction parallel to the infeed side of the table, a closure wall at the concentrates discharge end of the table that extends at an obtuse angle with respect to the infeed side and at an acute angle with respect to the discharge side of the table, said table having a smooth concentrates discharge end and having a covering that laps up against said end closure wall, said table having precipitate slots extending at right angles to said concentrates discharge end closure wall, a trap at the infeed side of the table and means discharging water toward said concentrates discharge end closure wall against said upwardly lapped portion of said covering.

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Witnesses:

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