Aug. 4, 1925. 1,548,536

J. H. MACARTNEY

CONCENTRATOR

Filed Feb. 12, 1924 4 Sheets-Sheet 1

Fig. 1.

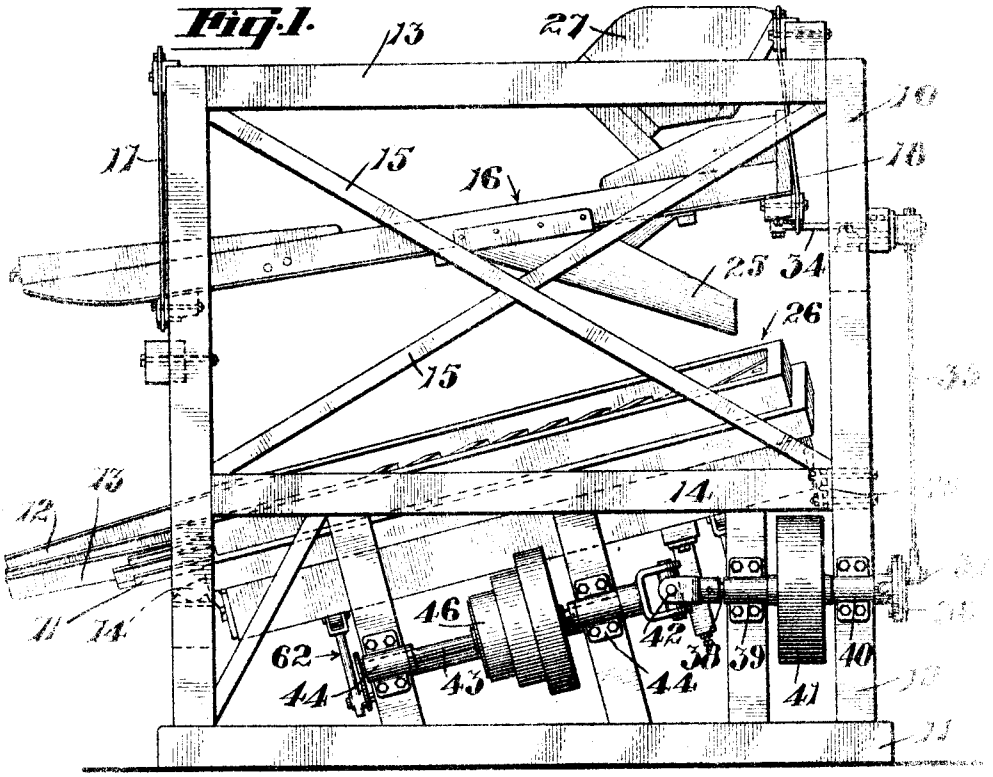
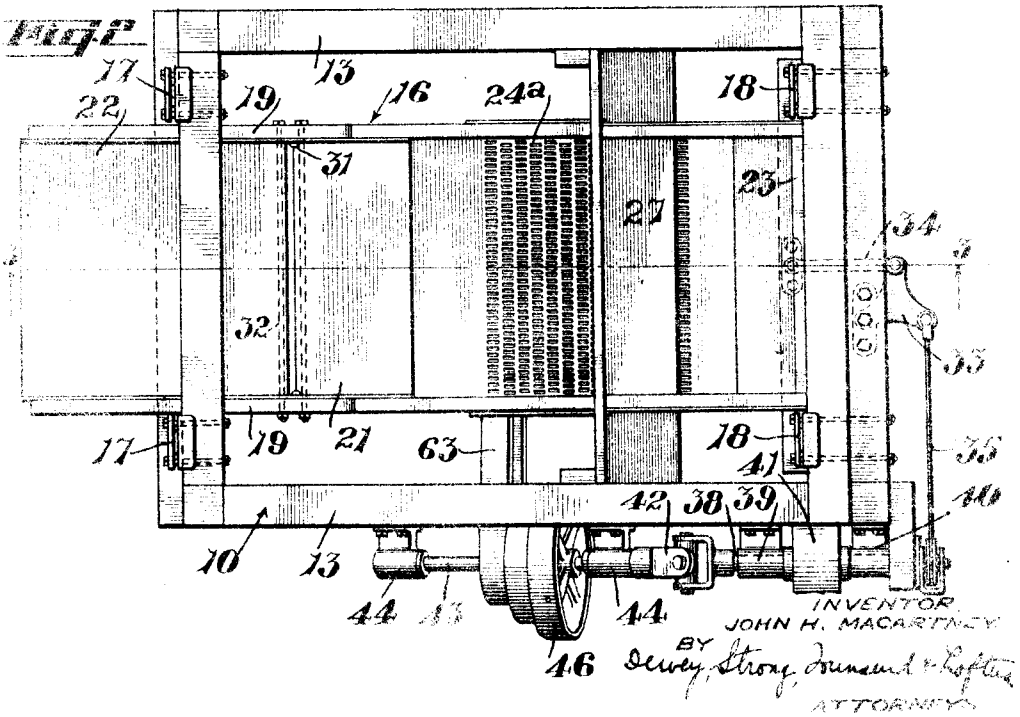



Fig. 2.




INVENTOR
JOHN H. MACARTNEY
BY
Dewey, Strong, Dunsand & Lofton
ATTORNEYS

Aug. 4, 1925.

1,548,536

J. H. MACARTNEY

CONCENTRATOR

Filed Feb. 12, 1924

4 Sheets-Sheet 2

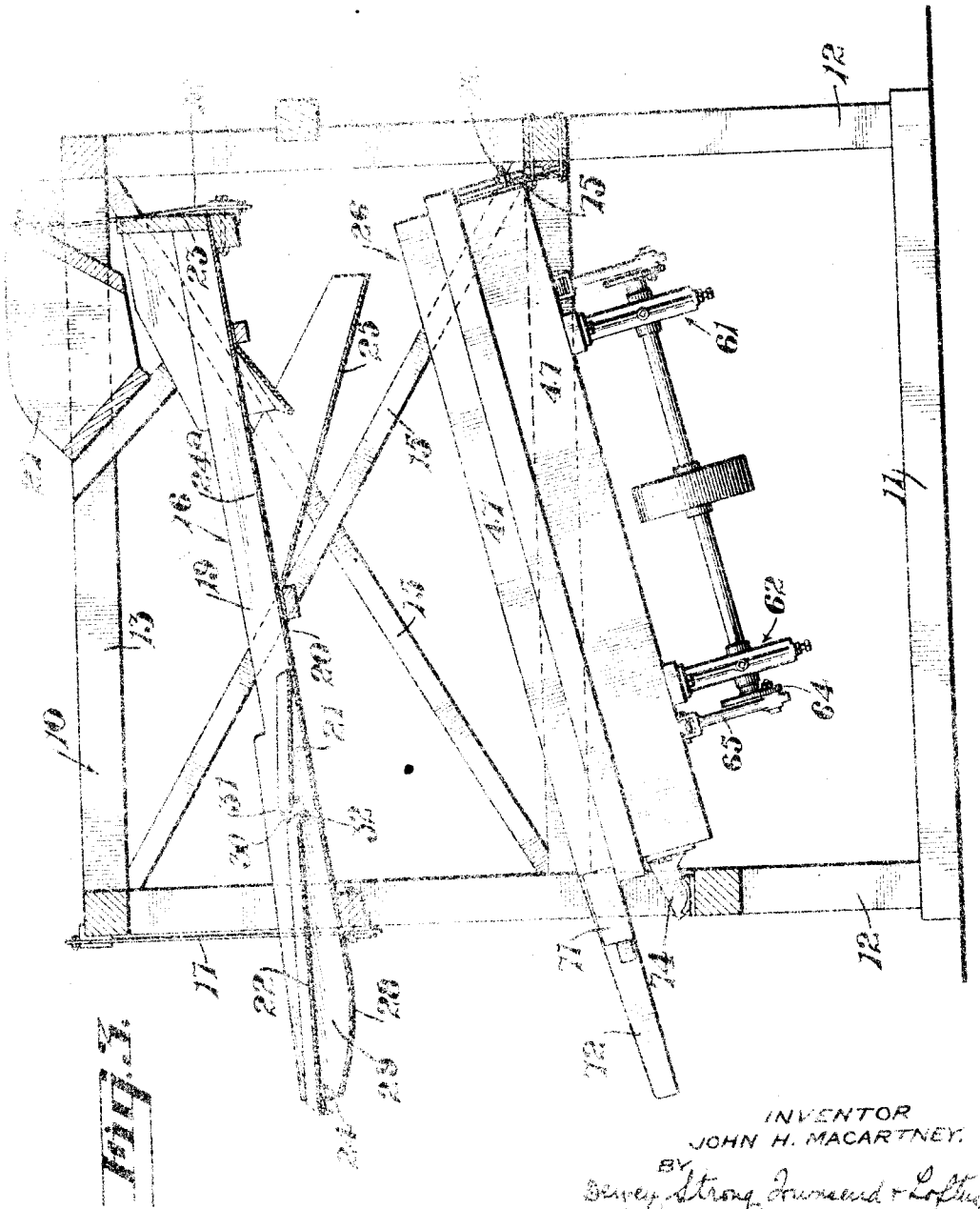



Fig. 1.

INVENTOR
JOHN H. MACARTNEY.
BY
Dewey, Strong, Damond & Lofton
ATTORNEYS

Aug. 4, 1925. 1,548,536

J. H. MACARTNEY

CONCENTRATOR

Filed Feb. 12, 1924 4 Sheets-Sheet 3

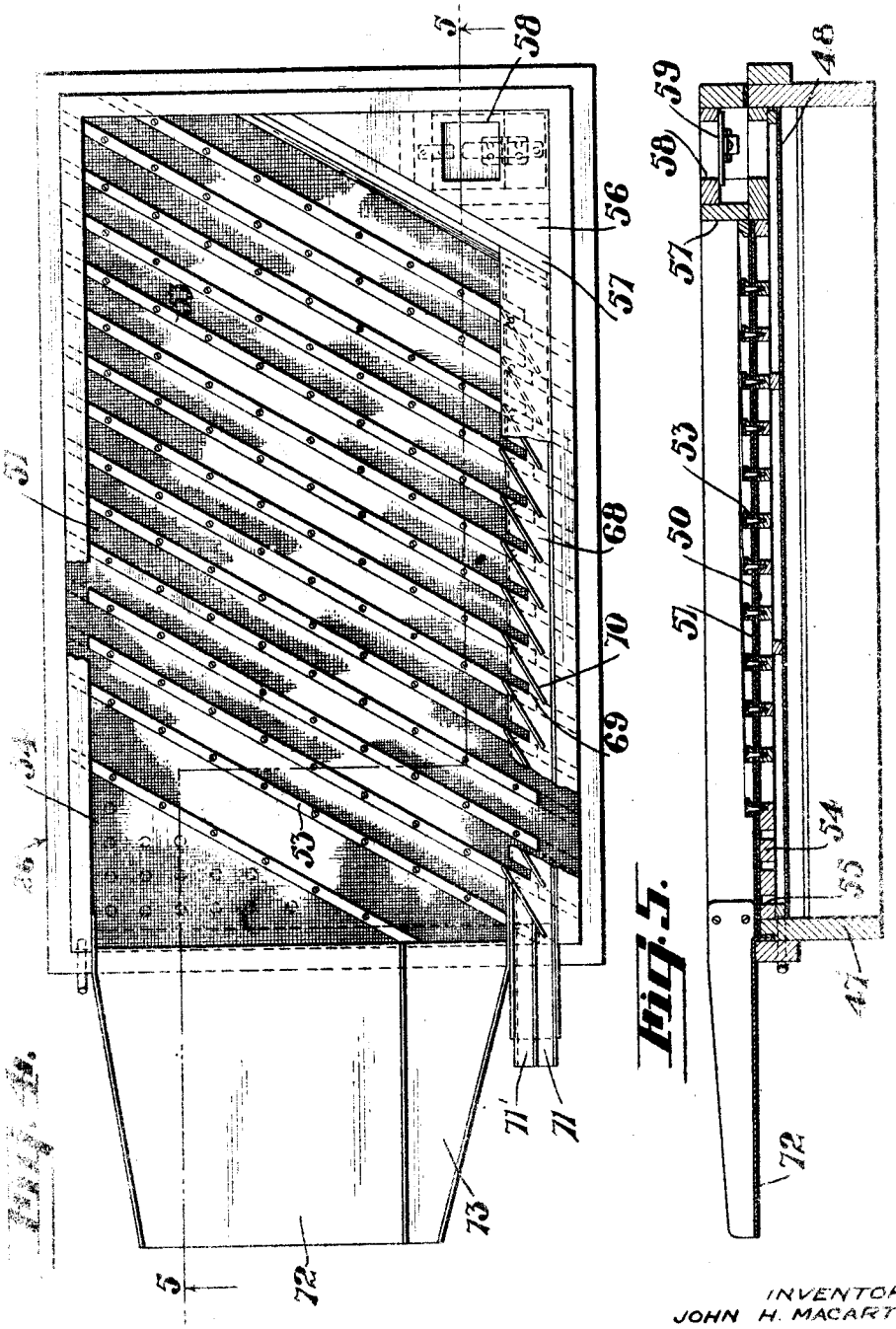



Fig. 5.

INVENTOR
JOHN H. MACARTNEY.
BY
Dewey, Strong, Symmes & Lyttle
ATTORNEYS.

Aug. 4, 1925. 1,548,536

J. H. MACARTNEY

CONCENTRATOR

Filed Feb. 12, 1924 4 Sheets-Sheet 4

Fig. 6.

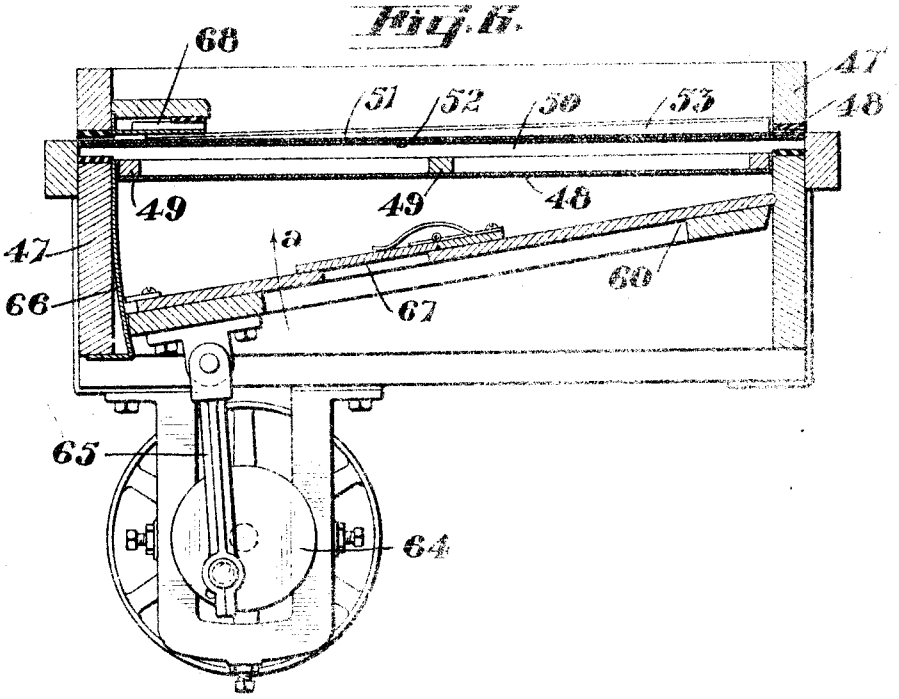
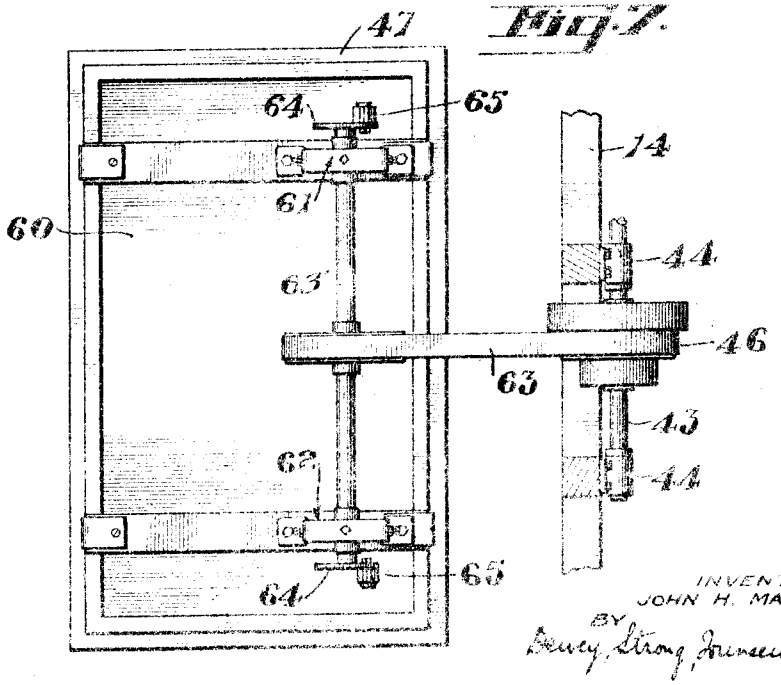



Fig. 7.




INVENTOR
JOHN H. MACARTNEY.
BY
Dewey, Strong, Townsend & Loftus
ATTORNEYS.

Patented Aug. 4, 1925. 1,548,536

# UNITED STATES PATENT OFFICE.

JOHN H. MACARTNEY, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-SIXTH TO HENRY J. BRINKMAN AND ONE-SIXTH TO CHARLES E. BRINKMAN, BOTH OF SAN FRANCISCO, CALIFORNIA.

## CONCENTRATOR.

Application filed February 12, 1924. Serial No. 692,266.

*To all whom it may concern:*

Be it known that I, JOHN H. MACARTNEY, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Concentrators, of which the following is a specification.

This invention relates to machinery for the recovery of gold and other precious metals, and particularly pertains to improvements in dry concentrators.

At the present time large areas of gold bearing soil cannot be worked due to the fact that water cannot be obtained, and it is the object of the present invention, therefore, to provide an apparatus for the working of gold bearing soil and gangue which will insure that a large percentage of the gold or other precious metal contained therein will be recovered, including the flour of the metal, provision being made to segregate the coarse gold, the middle grade gold, and the fine gold, as well as the tailings.

The present invention contemplates the use of an agitating member for separating the coarse gold from the gangue, and at the same time uniformly feeding the gangue to a concentrator table where separation of the particles of precious metal is mechanically effected.

The invention is illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a view in side elevation showing the complete machine.

Fig. 2 is a view in plan showing the machine as disclosed in Fig. 1.

Fig. 3 is a view in vertical section through the machine as seen on line 3—3 of Fig. 2.

Fig. 4 is a view in plan showing the concentrator table disposed in a horizontal plane.

Fig. 5 is a view in section through the concentrator table as seen on the line 5—5 of Fig. 4 and viewed in the direction of the arrows.

Fig. 6 is a view in transverse section through the concentrator table, showing the construction and operating mechanism of the bellows and the manner in which the concentrator table is pneumatically vibrated.

Fig. 7 is a view in plan showing the operating mechanism of the bellows.

Referring more particularly to the accompanying drawings, 10 indicates a main frame formed by horizontal frame members 11 upon which vertical frame posts 12 are disposed, and which posts are tied together at their opposite ends by horizontal members 13. Suitable intermediate braces 14 may be used as well as diagonal braces 15.

By reference to Fig. 2 of the drawings, it will be seen that the frame structure is rectangular in plan, and that it supports in its upper portion a shaker table 16. This table extends longitudinally of the machine, and is suspended from the top of the frame upon pairs of spring plates 17 and 18. The plates are rigidly secured by their upper ends to the frame and are adjustably secured to the table 16 at or near their lower ends. This makes it possible for the table to be given any desired inclination, and further to permit the rear end of the table to be disposed on a lower horizontal plane than the forward end, so that the table when vibrating will have a sweeping movement substantially on an arc described from some imaginary point above the frame. This scooping action is provided for a purpose which will be hereinafter set forth.

By reference to Fig. 3, it will be seen that the shaker table is formed with side portion 19, a main floor 20, and false floor members 21 and 22. The forward end of the main floor 20 is closed in by an end board 23, while the opposite end is slightly curved upwardly and terminates in a throat 24 disposed beneath the free end of the false floor member 22. The portion of the main floor extending substantially from the point of support by the plates 17 to the forward end is in a single plane. The portion of this floor in advance of the first false floor member 21 is formed with a perforated area as indicated at 24ª, through which gangue of a desired fineness may pass. A chute 25 is secured to the table and beneath the perforated area of the floor, so that the gangue will be delivered onto concentrator table 26 which is disposed therebeneath. It will be understood that the gangue has been previously delivered to the shaker table through a feed hopper 27. The curved end portion of the main floor 20 is perforated as indicated at 28 to permit fine extraneous matter

to be shaken from among the nuggets which will be entrapped in the pocket 29 beneath the false floor member 22. Attention is directed to the fact that the false floor member 21 is a short one tending to receive the gangue which has not passed through the perforations 24, and to lift all of this gangue off of the main floor 20. A trap opening 30 is formed between the rear end of the floor member 21 and the forward end of the floor member 22, and through this slotted passageway a heavy material, such as nuggets of the metal, may pass and will accumulate in the pocket 29. For convenience, the floor member 21 is pivoted to the table at 31 and the floor member 22 is pivoted to the table on the pin indicated at 32.

The table is given an oscillatory vibration by means of a bell crank 33 suitably mounted for horizontal swinging movement on the frame 10 and carrying a pitman rod rod 34 secured to the forward end of the table 16. The other arm of the bell crank is connected with an operating cable 35 to a crank disk 36, by the rotation of which oscillation of the bell crank is effected. Any suitable means may be used to vary the eccentricity of the bolt 37 carried by the disk 36. This disk is mounted upon a shaft 38 journaled in bearings 39 and 40 secured to the frame. Between these bearings a pulley 41 is provided to drive the shaft. A universal coupling 42 connects the shaft 38 with the shaft 43 disposed at an inclination to the horizontal and supported by bearings 44. This shaft carries a cone pulley 46 for driving the mechanism shown in Figs. 6 and 7 of the drawings, and to be hereinafter described.

The concentrator table 26 which is disposed beneath the shaker table 16 is of peculiar construction and differs from the shaker table previously described. The shaker table is preferably formed of sheet metal while the floor of the concentrator table is peculiarly constructed by the arrangement of a plurality of screens and cloth partitions.

Referring particularly to Figs. 4, 5 and 6 of the drawings, it will be seen that the table is formed with a rectangular frame 47′ near the top of which is stretched a cloth partition member 48. The frame carrying this partition as indicated at 49 is fitted within the rectangular main frame 47, and may move vertically relative thereto. Secured to the frame members 49 are laterally extending bars 50. These bars are disposed in spaced relation to the cloth partition 48. The ends of the bars project over the upper face of the frame member 47 and normally rest on the gasket strips 48′. Stretched across the tops of the bars 50 is the main floor of the concentrator table 26 which comprises an upper layer of cloth 51 and a lower layer of screen 52 disposed in close proximity to each other and in spaced relation to the cloth partition member 48. It will thus be evident that a compartment will be formed between the two members 51 and 52 and the member 48.

A retaining frame member 47′ is disposed above the frame member 47 and supported in a manner to permit slight vertical movement of the bars 50 relative to the frame. This movement will, of course, be accompanied by the complete movement of the floor structure previously described. Fastened to the bars 50 and over the top of the cloth floor member 51 are riffle bars 53. These bars may be formed of any material desired, although metal is preferable due to the wearing qualities.

By reference particularly to Fig. 4, it will be seen that the bars 50 and the riffle bars 53 which are directly superposed thereover, are not disposed in direct lateral alignment with relation to the longitudinal axis of the concentrator table, but are disposed at an inclination. In the present instance this is sixty degrees, although under varying conditions the table may be designed with riffle bars disposed at different angles. In the upper left hand corner of the concentrator table as shown in Fig. 4, the triangular portion 54 occurs. This portion of the table has a solid floor 55 disposed beneath the coverings 51 and 52 as shown in Fig. 5. Openings 55 are formed at intervals through the solid floor 54 for directing jets of air through the members 51 and 52. In the lower right hand corner of Fig. 4, it will be seen that a triangular portion 56 is provided. This is solid and is set off from the main body of the concentrator table by a partition wall 57. A valve opening 58 is formed through the solid floor member and is normally closed by a flapper valve 59 held in close position by air pressure exerted from beneath the table.

This air pressure is created by the provision of a false floor 60 within the frame member 47 of the concentrator table and beneath the table structure embodying the cloth partition 48, and the cloth and wire members 51 and 52. The false floor is positioned to pivot along one edge of the frame and to be oscillated by driving mechanisms 61 and 62 which receive their power from the pulley 46, and driven by a belt 63. Each of the driving mechanisms comprises a crank disk 64, and a pitman rod 65. The free end of the rod is connected to a bearing carried by the free edge of the floor 60 so that the floor may move vertically as it is confined between its pivot point and an arcuate member 66 disposed within the frame 47. A trap valve 67 is formed in the false floor member 60 so that on the down-

stroke air can enter the compartment formed between the false floor 67 and the lower cloth member 48. This valve will automatically close on the up-stroke of the rod 65.

By reference to Fig. 4 it will be seen that along one edge of the table a perforated plate 68 is provided. This plate is disposed directly above the concentrating floor and is formed with a plurality of notches 69, one of which occurs between the adjacent ends of a riffle bar 52. Deflector vanes 70 are disposed between each of the notches and tend to direct the free gold which is collected from between the riffles and passes through the meshes to move along the plate 68 and be drawn off through the spout 71. A large chute 72 is formed at the rear end of the table to carry off the gangue which has been washed. This chute is partitioned to form a small spout 73 into which the concentrate caught by the last riffle on the table will be directed so that a sample of the concentrate may at all times be taken.

To effectively operate the machine with which the present invention is concerned the concentrator table must be disposed on a compound angle, that is, the head end must be higher at the forward end into which the gangue is delivered and also from one side of the concentrator table to the other than the other. The highest point of the table is the corner occupied by the riffle 53 and the lower corner is that which opposite thereto. Due to this arrangement, it will be necessary for the gangue to travel in a general direction downward from the point of delivery to the chute 72, and at the same time the concentrate for the reverse action must be moved along the individual riffles to the off-take plate 68. This movement, a very fine grading of the concentrate is brought about and a maximum recovery obtained.

In washing gravels of different grades and consistency it is desirable to change the inclination of the table and for this purpose the table is supported at its forward end by a pair of legs 74 as shown in Fig. 2, and adjustably supported at its upper end indicated at 75 by a pair of supporting legs 76 pivoted around a pivot rod 77 at the rear end of the table. Adjustment of the table may be effected by

In operation, the machine is set in position on the drawings and the table is made to properly discharge the gangue and to dispose the concentrate in the desired angle and to dispose the concentrate in the desired manner. The pulley 64 is connected to any suitable source of power and will continuously drive the [illegible] rotation of

the crank disk 79 which will alternately pull and release the cable 63 thereby to oscillate the roll crank 58 and impart longitudinal vibration of the [illegible] Due to the different positions of the pairs of supporting [illegible] the table will have some [illegible] will tend to [illegible] to work the heavier [illegible] into the open [illegible] number [illegible] the riffles [illegible] gangue will [illegible] Lugs 54 on the [illegible] raised into [illegible] spout 71.

[illegible] shake, [illegible] to [illegible] drive the pulley 64 [illegible] the belt 62 to [illegible] shaft carries [illegible] fitted with [illegible] at 81 and 82 in Fig. 1. This arrangement will cause the [illegible] oscillate in the direction [illegible] stroke air can enter [illegible] floor 67 and [illegible] rapidly [illegible] lift the [illegible] the concentrate [illegible] cloth 48 and [illegible] bodies rising [illegible] pressure [illegible] the concentrate [illegible] is passing [illegible] vertical [illegible] remain on [illegible] all of the [illegible] particles [illegible] gravity to [illegible] the same [illegible] it to the [illegible] riffle bars [illegible] table for passing [illegible] high grade [illegible] lower grade [illegible] of the [illegible]

The water [illegible] off the [illegible] gangue will [illegible] Samples may [illegible] portion 72 of the [illegible] seen that the [illegible] riffles a greater [illegible] particles [illegible] particles [illegible] fairly separate [illegible] less of their [illegible] higher [illegible] which [illegible] corresponds.

It will further be [illegible] invention [illegible]

varying conditions so that a mechanism for the recovery of a desired metal may be obtained.

While I have shown the preferred form of my invention as now known to me, it is to be understood that various changes may be made in its construction without departing from the invention as defined in the appended claims.

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

1. In an ore concentrator, a concentrator table, and pneumatically operated means adapted to mechanically maintain gangue supported on the table in a condition of disturbance by bodily vibrating the table and to act by pneumatic force to directly disturb pneumatically the particles of gangue and effect their separation.

2. An ore concentrator comprising a shaker table onto which gangue is delivered, a concentrator table disposed therebeneath to receive the sifted gangue from the shaker table, and pneumatic means embodied in concentrator table to bodily vibrate the floor of the table and for directly forcing air into the gangue thus separated to disturb the particles thereof and effect their separation.

3. In an ore concentrator, a concentrate ore table disposed at an angle to the horizontal diagonally corner to corner whereby one end and an adjacent side are higher than the corresponding opposite end and adjacent side, a floor in said table, riffle bars disposed across the floor in spaced relation to each other, and pneumatic means for bodily vibrating the table and for directly acting upon the gangue supported by the table to cause the gangue to move towards the lower corner of the table and the metals to be recovered to move towards the higher edge of the table.

4. In an ore concentrator, a concentrate ore table disposed at an angle to the horizontal diagonally corner to corner whereby one end and an adjacent side are higher than the corresponding opposite end and adjacent side, a floor in said table, riffle bars disposed across the floor in spaced relation to each other, pneumatic means for bodily vibrating the table and for directly acting upon the gangue supported by the table to cause the gangue to move towards the lower corner of the table and the metals to be recovered to move towards the higher edge of the table, and means for continuously drawing off the recovered metals as they reach the higher edge of the table.

5. In an ore concentrator, a concentrator table comprising a floor formed of a foraminous sheet of material, a second floor member spaced therefrom and therebeneath and also formed of a foraminous sheet of material, riffle bars directly secured upon the upper face of the upper sheet of material, one of the floors being loosely mounted and means for passing a uniform column of air through the complete floor structure to bodily vibrate the loosely mounted floor and to directly act upon the gangue supported thereon.

6. In an ore concentrator, a concentrator table comprising a floor formed of a foraminous sheet of material, a second floor member spaced therefrom and therebeneath and also formed of a foraminous sheet of material, riffle bars directly secured upon the upper face of the upper sheet of material, the upper floor being loosely mounted, means for passing a uniform column of air through the complete floor structure to bodily vibrate the upper floor and to directly act upon the gangue supported thereon, and means whereby said pneumatic action will cause the gangue to move lengthwise of the table and the recovered metal to be separated from the gangue and to move laterally of the table.

7. An ore concentrator comprising a main frame, a shaker table supported at the top thereof for vertical swinging movement, mechanical means for actuating said table, a concentrator table disposed directly beneath said shaker table and adapted to receive the sifted gangue from the shaker table, and pneumatic means for bodily actuating the concentrator table to separate the sifted gangue and the metal particles carried thereby.

JOHN H. MACARTNEY.