

No. 879,069.

G. TOLMIE.  
DRY ORE CONCENTRATOR  
APPLICATION FILED NOV. 20, 1906.

PATENTED FEB. 11, 1908.

3 SHEETS—SHEET 1.

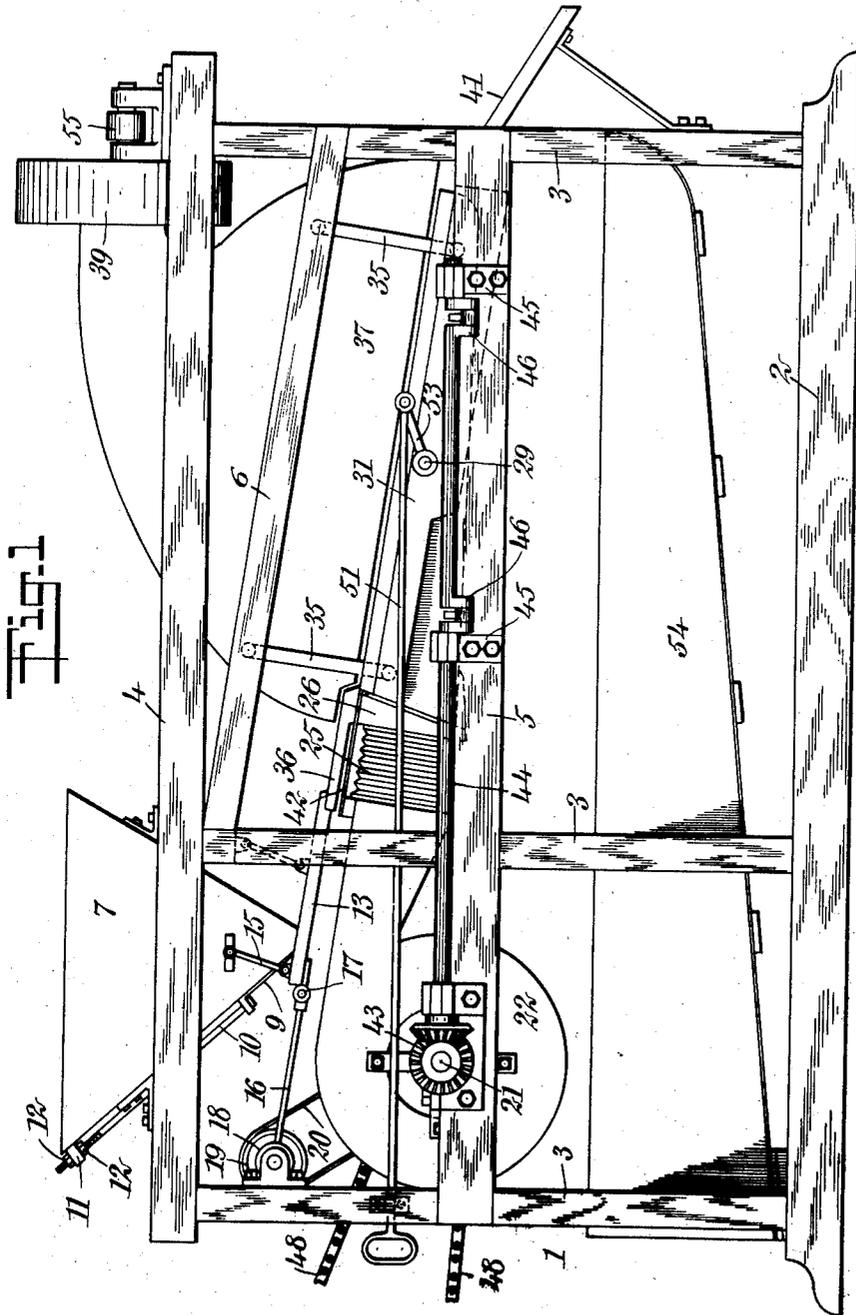


Fig. 1

WITNESSES  
*F. D. Sweet.*  
*J. D. ...*

INVENTOR  
*George Tolmie*  
BY *Munn Co*  
ATTORNEYS

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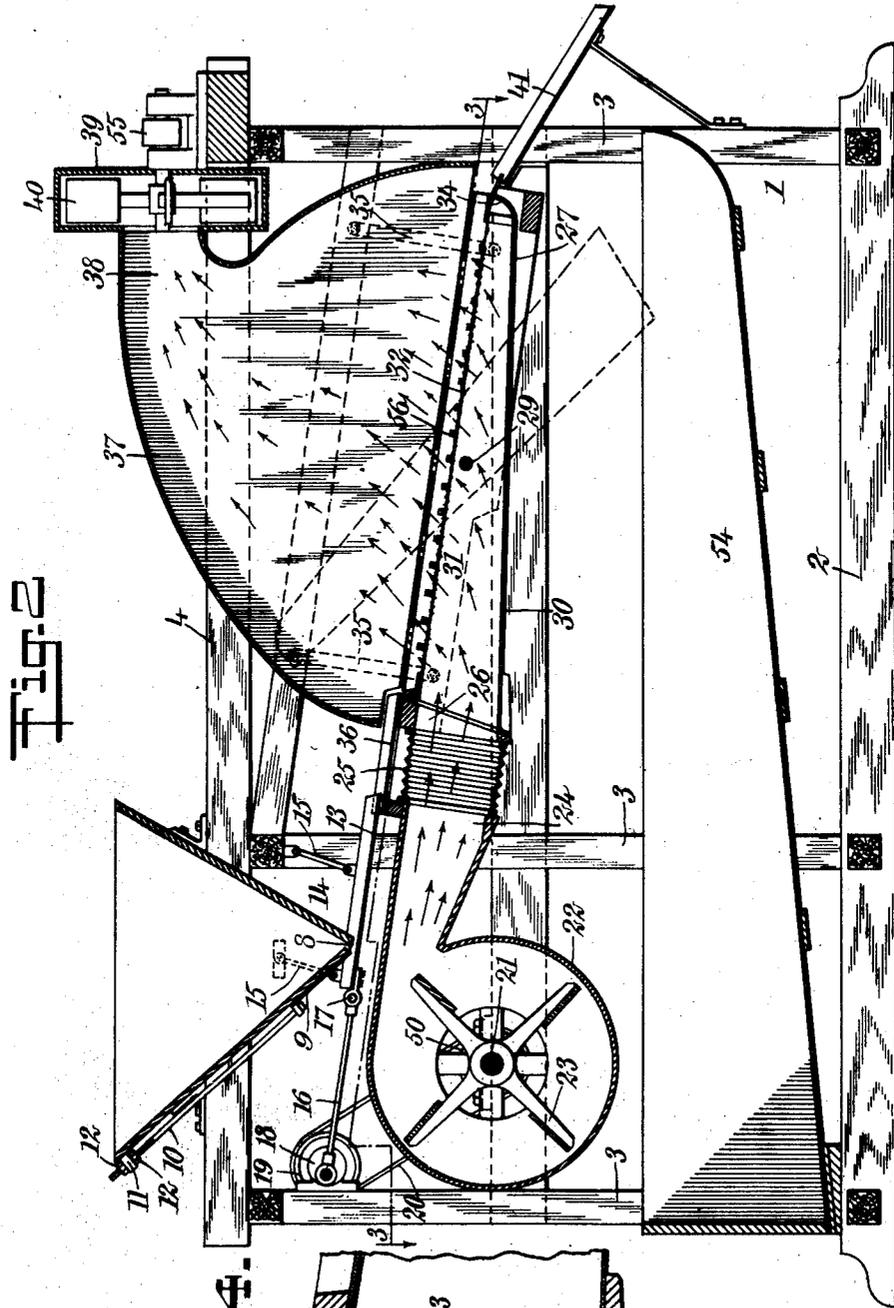
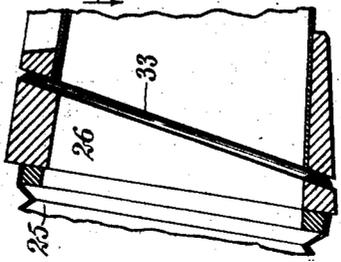


Fig. 2

Fig. 4



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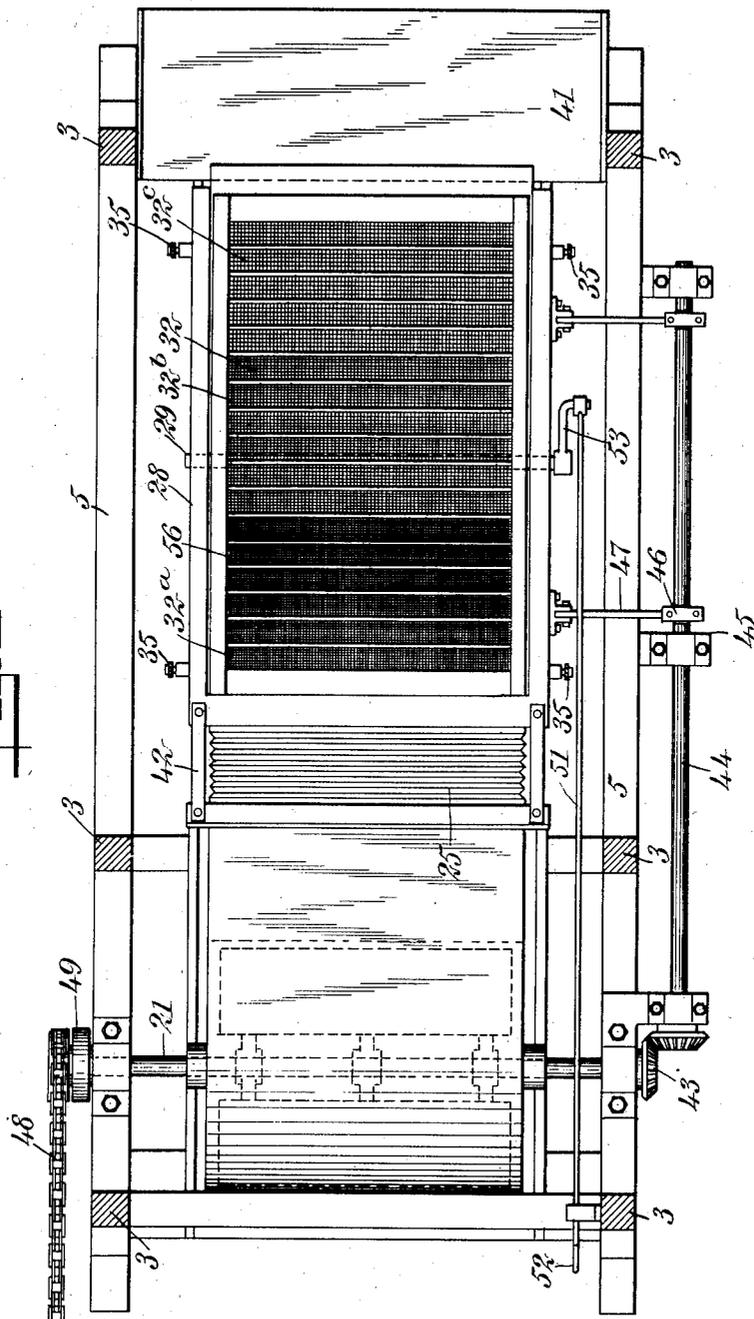
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3 SHEETS—SHEET 3.

Fig. 3



WITNESSES

*F. D. Sweet*  
*J. A. Munn*

INVENTOR

*George Tolmie*

BY

*Munn & Co*

ATTORNEYS

# UNITED STATES PATENT OFFICE.

GEORGE TOLMIE, OF OGDEN, UTAH, ASSIGNOR OF ONE-FOURTH TO DENNIS E. GLEASON, OF OGDEN, UTAH.

## DRY ORE-CONCENTRATOR.

No. 879,089.

Specification of Letters Patent.

Patented Feb. 11, 1908.

Application filed November 20, 1906. Serial No. 344,232.

*To all whom it may concern:*

Be it known that I, GEORGE TOLMIE, a citizen of the United States, and a resident of Ogden, in the county of Weber and State of Utah, have invented a new and Improved Dry Ore-Concentrator, of which the following is a full, clear, and exact description.

This invention relates to ore-concentrators and is especially applicable as a dry concentrator to operate upon ores having a relatively high specific gravity.

The object of the invention is to produce a concentrator of this class which is simple in construction and which will operate very efficiently to separate the ore or values from the dirt and gangue with which the ore occurs.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a concentrator constructed according to my invention; Fig. 2 is a longitudinal vertical section taken through the concentrator; Fig. 3 is a section taken substantially on the line 3—3 of Fig. 2; and Fig. 4 is a vertical section taken at a joint of the machine and illustrating details of the construction thereof.

Referring more particularly to the parts, 1 represents the frame of the machine, which comprises base sills 2 in which uprights or standards 3 are stepped as shown. These uprights support parallel upper sills 4. On the side of the frame a longitudinally disposed horizontal bar or beam 5 is attached, the purpose of which will appear more fully hereinafter. Near the upper portion of the frame inclined bars 6 are arranged, the same being rigidly attached in the framing as shown.

In the upper portion of the frame 1 there is mounted a feed hopper 7 which presents inclined sides or walls, as indicated. At its lower portion, the hopper is provided with a feed opening 8, the extent of opening of which may be regulated by means of a door or shutter 9 which is slidably mounted on the side wall of the hopper as shown very clearly in Figs. 1 and 2. This shutter is controlled by means of a threaded stem 10 which

extends toward the upper edge of the hopper, passing through a lug 11 which projects from the side wall thereof, as indicated. Adjacent to the lug 11 the stem 10 is provided with nuts 12 which enable the shutter to be adjusted up or down, as will be readily understood.

Just below the hopper 7 I provide a shuffle plate or feed plate 13 which is disposed in an inclined position as shown. This plate is provided with flanges 14 at its side edges, to which short links 15 are pivotally attached, the upper portions of these links being attached respectively to the framing or to the hopper as shown. This plate is adapted to be reciprocated or rocked when the machine is in operation, by means of a pitman or connecting rod 16, which is pivotally attached at 17 to the upper edge of the plate. The other end of the pitman is attached to a disk crank 18 which is rigid with a belt pulley 19, the said belt pulley being driven by means of a belt 20 from a blower shaft 21.

Just beneath the hopper in the frame 1 there is supported a blower case 22 through which the aforesaid blower shaft 21 passes, and within this case a fan 23 is provided, which is rigidly mounted on the shaft 21. The case 22 is open at the sides so that the fan may generate an air current from the case through a trunk 24 which leads longitudinally of the frame and in the direction of the lower edge of the shuffle plate 13. This trunk 24 is connected by a flexible joint 25 with a ring 26, which ring constitutes a part of a concentrating table 27. This table 27 includes a substantially rectangular frame 28, as indicated most clearly in Fig. 3. In the side bars of this frame there is rotatably mounted a dumping shaft 29, and this shaft carries rigidly the body or shoe 30 of the concentrating table. This shoe is preferably formed with a sheet metal bottom, wooden sides 31 and small end. The upper side of this body or shoe is covered by a screen 32, upon which the concentration occurs, the same being formed in three sections, 32<sup>a</sup>, 32<sup>b</sup>, 32<sup>c</sup>, which are of different mesh, for a purpose which will be stated more fully hereinafter. The end of the shoe 30 which lies adjacent to the ring 26 is open, and this end of the shoe is cut upon an inclined plane so as to enable the end of the shoe to seat against the ring 26 in the manner indicated in Fig. 2. In

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this connection it should be understood that the face of the ring 26 lying adjacent to the shoe is also cut upon an inclined plane, so that the parts may meet to form a substantially tight joint. In this connection, reference is had to Fig. 4. Between the end of the shoe and the side face of the ring I place a gasket 33, of rubber or similar flexible material, which facilitates the forming of a tight joint at this point. The end of the shoe opposite the ring 26 is covered by turning the material of the bottom upwardly to form a flange 34, as indicated in Fig. 2. With this arrangement it should be understood that when an air current is generated by the fan this current will pass through the shoe and up through the screen 32. The concentrating table 27 is supported by means of hangers 35, which hangers simply consist of links, the lower ends of which are pivoted to the frame 28 of the table, and the upper ends of which are pivotally attached to the inclined bars 6 referred to above.

It will be understood that the points of connection between the hangers and the frame 28 are loose so as to allow of a lateral play or rocking movement of the concentrating table.

The ore-bearing material is carried onto the screen from the shuffle plate 13, by means of an apron 36, which apron consists simply of an inclined plate, the upper edge of which projects under the lower edge of the plate 13, and the lower edge of which projects over the ring 26. The side edges of this apron are turned upwardly, as shown, so as to prevent the material from falling from the plate at the sides.

The entire shoe 30 is covered by a large hood 37, which is preferably formed of sheet metal or similar material. The upper portion of this hood is formed into a neck 38, which communicates with a fan casing 39 in which there is provided an exhaust fan 40. It should be understood that the material, after passing across the screen, is delivered upon a tail plate 41, which is mounted in an inclined position as indicated most clearly in Fig. 2. The frame 28 preferably inclines in the same direction as the shuffle plate 13, and the screen 32 is similarly inclined. Near its upper edge the frame 28 is connected, by a link 42, with the upper side of the blower trunk 24. These links allow the lateral movement of the frame, but do not allow of a longitudinal movement thereof.

I provide means for giving the concentrating table a lateral rocking motion when the machine is in operation. For this purpose, the counter shaft is extended at the side of the frame 1, as indicated in Fig. 3, and by means of bevel gears 43 this shaft is connected with a shaker shaft 44 which extends longitudinally of the frame and is mounted in suitable bearings 45. This shaker shaft

is provided with cranks 46 which are connected by means of pitmen or connecting rods 47 with the side of the frame 28, as shown. In small machines, the blower shaft may be rotated by hand with a crank or a similar contrivance. In larger machines, I arrange to drive the shaft 21 by means of a belt or chain 48 which passes over a suitable pulley 49. The belt 20 which was referred to above, is driven from the shaft 21 by means of a suitable pulley 50, so that when the machine is in operation, the shuffle plate 13 will be reciprocated in a direction longitudinally of the frame.

It should be understood that the values are not expected to pass through the screen and fall into the shoe, as, from time to time, the shoe will be dumped. In order to enable the shoe to be dumped in the manner suggested, I provide a dumping rod 51 which extends longitudinally of the frame as shown in Fig. 3, and which is provided at its lower extremity with a suitable handle 52. The opposite extremity of the dumping rod is attached pivotally to a crank 53 which is rigid on the dumping shaft 29, as will be readily understood. Evidently, by operating this rod, the shoe may be thrown into a position such as that indicated in dotted lines in Fig. 2. When operated in this manner, the material on top of the shoe will be dumped into a receiver or pan 54, which is constructed in the lower portion of the frame 1, as indicated.

The exhaust fan 40 will be driven by a belt pulley 55 rigid on the shaft thereof. In the operation of the machine it should be understood that as the ore-bearing material passes over the screen top of the concentration table that the air current generated by the blower in the case 22 passes up through the screen and the body of the material. In this way the lighter gangue or earth is carried away, while the small particles of dust are removed by fan 40 and the heavier ore remains on the table.

In order to increase the efficiency of the concentrating or separating operation, I make the different sections of the screen of different meshes or degrees of fineness, as suggested above. I make the upper screen of 120 mesh, the lower screen of 80 mesh and the intermediate screen of 100 mesh. By making the screens of different mesh in this way I equalize the force of the air current which passes up through the screen top of the concentration table. In this connection it should be understood that there is a tendency for the principal portion of the air to pass through the upper screen which is nearest to the blower. By making this screen of finer mesh in this way, the resistance at this point is slightly increased, which tends to throw a larger quantity of the current toward the lower portion of the shoe. Across the face of the screen I provide a plu-

ality of transverse bars or riffles 56 which arrest the ore and retain it on the concentration table.

By reason of the flexible connection 25, it should be understood that a perfect air-tight joint is constantly maintained between the blower trunk 24 and the shoe. The motion of the shuffle plate or feed plate is, of course, proportional to the speed at which the machine is being driven, so that the amount of ore fed will be greater where the machine is being driven at a higher rate of speed.

The concentrator may be used for concentrating ores carried in sand, gravel or earth.

The riffles referred to above are much higher at the end of the concentration table which receives the ore, as it is desirable to retain less material on them as the ore becomes lean. All the valuable, heavy metals are held behind the riffles and subsequently dumped into the receiving box beneath the concentration table.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In an ore-concentrator, in combination, a frame, a rocking frame mounted therein and adapted to reciprocate, said rocking frame having a ring formed at the end thereof, a connection from a blower to said ring whereby an air current may be delivered through said ring, a shoe rotatably mounted in said rocking frame and closing upon said ring whereby an air current may

pass from said ring to said shoe, said shoe having a screen in the upper portion thereof through which an air current may pass, and means for feeding an ore-bearing material across said screen.

2. In an ore concentrator, in combination, a frame, a rocking frame, a shoe mounted to swing on transverse pivots in said rocking frame, a blast connection leading to said shoe and having an inclined face against which said shoe seats by a swinging movement, and a screen over said shoe and through which the blast passes upwardly.

3. In an ore concentrator, in combination, a frame, a rocking frame mounted thereupon, a shoe mounted to swing on transverse pivots in said rocking frame, a trunk leading a blast to said shoe, a flexible connection on said trunk, a ring attached to said flexible connection and having an inclined face disposed toward said shoe, said shoe having an inclined end adapted to seat against said inclined face by a swinging movement of said shoe, a screen above said shoe and through which the blast passes upwardly, means for advancing a material across said screen, and means for dumping said shoe.

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

GEORGE TOLMIE.

Witnesses:

W. D. BROWN,  
R. B. HINCHCLIFF.