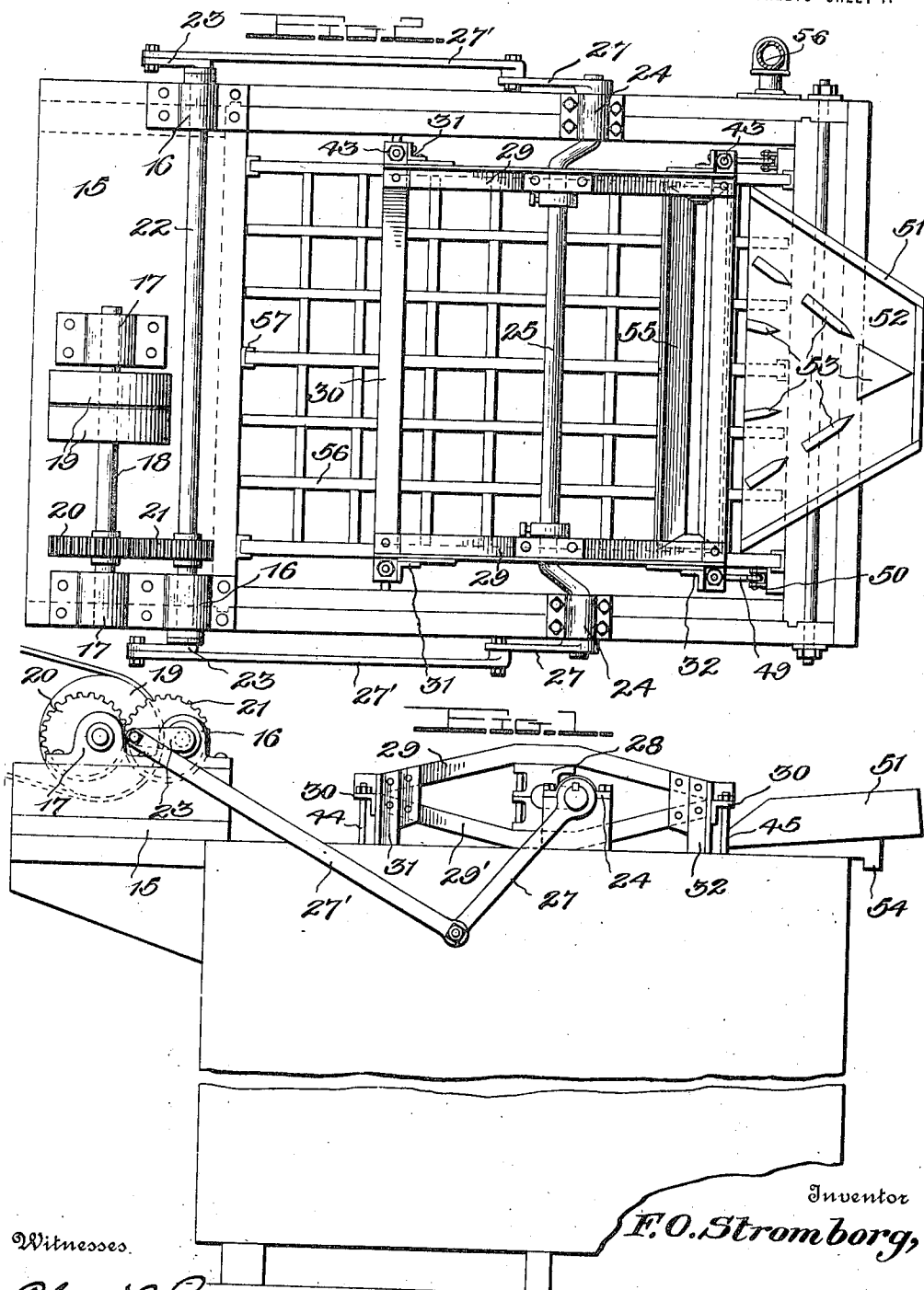


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ORE CONCENTRATOR.
APPLICATION FILED MAR. 26, 1914.

Patented July 13, 1915.
2 SHEETS—SHEET 1.



Witnesses.

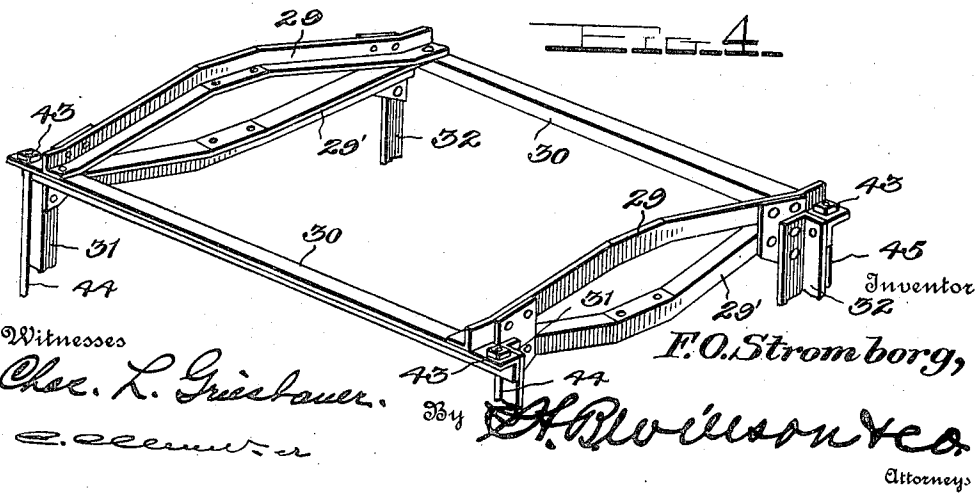
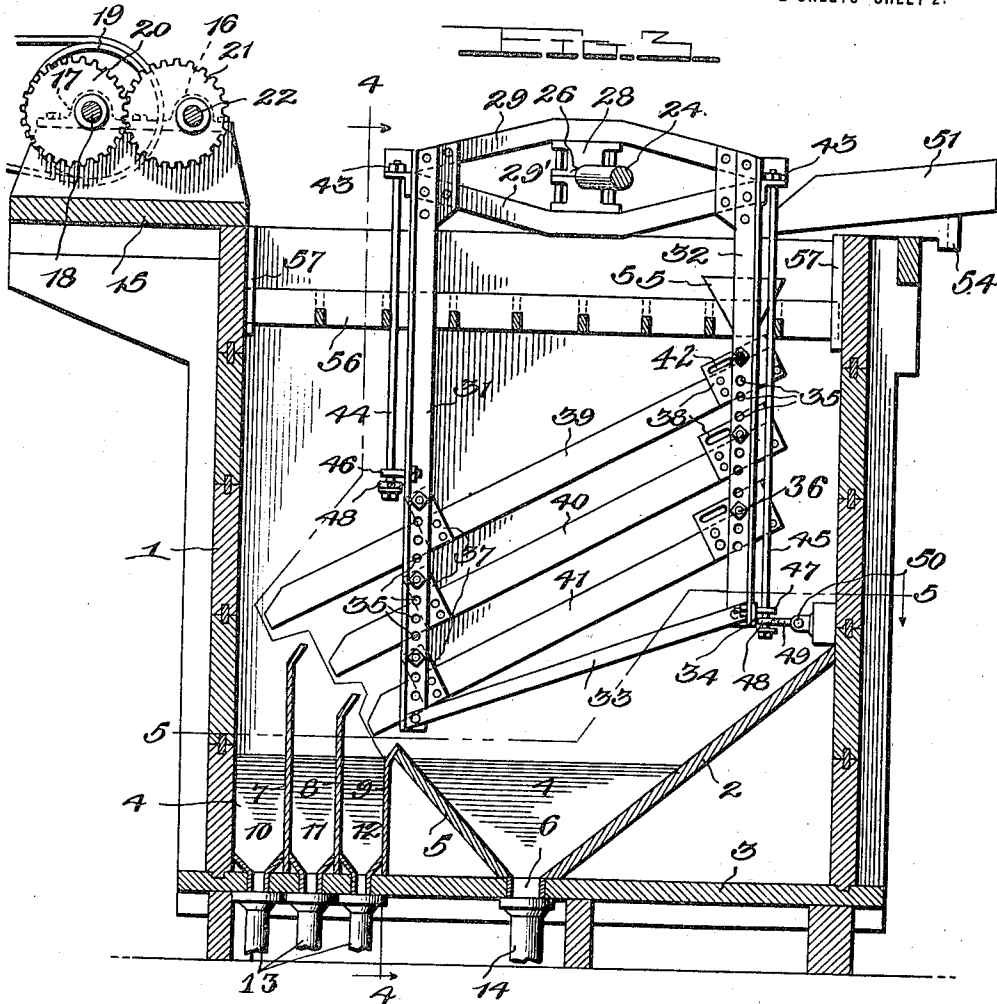
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Witnesses

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FRITZ OSCAR STROMBORG, OF SALT LAKE CITY, UTAH.

ORE-CONCENTRATOR.

1,146,211.

Specification of Letters Patent.

Patented July 13, 1915.

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To all whom it may concern:

Be it known that I, FRITZ O. STROMBORG, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain
5 new and useful Improvements in Ore-Concentrators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others
10 skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in ore concentrators and more particularly to those employing a plurality of screens hav-
15 ing openings of graduated size, said screens being mounted for movement within a tank of water.

The primary object of the invention is to provide a simple and efficient means for sup-
20 porting said screens in such a manner as to allow them to have a vertical and longitudinal oscillating movement.

A secondary object is to provide means for imparting a rather rapid movement to
25 said screens when moved in one direction and for reducing the rate of speed thereof when moved in the opposite direction.

With the above and other objects in view, the invention resides in certain novel fea-
30 tures of construction and combination hereinafter described and claimed and shown in the drawings wherein:

Figure 1 is a side elevation of my improved ore concentrator; Fig. 2 is a plan
35 view thereof; Fig. 3 is a vertical section through the tank, the parts on the interior thereof being shown in elevation; Fig. 4 is a perspective view of the upper portion of the screen supporting frame.

40 In the accompanying drawings, I have shown my improved ore separator or concentrator as comprising a tank 1 having an inclined partition 2 extending between its
45 opposite sides and across one of the corners of said tank between its bottom 3 and one of its upright sides. Extending from the partition 2 to the opposite upright side of the tank is a number of inclined walls 4
50 which meet and are joined at their upper edges, while their lower edges are secured to said bottom, while still another inclined wall 5 co-acts with the partition 2 and the walls 4 to produce ore receiving hoppers 6
55 between said partition, the wall 5, the walls 4 and the upright walls of the tank 1.

Arranged transversely of the tank 1 and

rising from the bottom thereof is a plurality of upright partitions 7, 8 and 9 which co-act with the upright side walls of the tank 1 and with the walls 4 to produce ore hoppers 60 10, 11 and 12. Each of the hoppers 10, 11 and 12 is provided with a suitable outlet pipe 13, while the hoppers 6 are provided with similar discharge pipes 14, the purpose of said pipes being obviously to convey the ore deposited in the various hoppers to any
65 desirable points.

One side of the tank 1 is provided on its upper edge with an outwardly extending shelf or ledge 15 which carries bearings 16
70 at its opposite ends and similar bearings 17 which are spaced from the bearings 16 and support a transverse shaft 18, which may be driven in any suitable manner, as by pulleys 19, and which carries an eccentric gear 20
75 which meshes with a similar gear 21 which is rigidly secured on a shaft 22 which is journaled in the bearings 16. The shaft 22 carries radial arms 23 at its opposite ends, said arms being provided for a purpose to be
80 hereinafter set forth.

Revolubly mounted in suitable bearings 24 carried by the upper edges of two of the side walls of the tank 1 is a transversely
85 disposed crank shaft 25 which has its eccentric portion lying between said side walls, its opposite ends carrying arms 27 which are of greater length than the arms 23 and are pivotally connected thereto by means of connecting rods or links 27'. By
90 this construction, when the shaft 18 is rotated by one of its pulleys 19, motion will be transmitted through the gears 20 and 21 to the shaft 22, the arms 23 of which will then be caused to rotate and will, through
95 the action of the connecting rods 27', rock the arms 27 and the crank shaft 25. Due to the arrangement of the eccentric gears 20 and 21, the shaft 22 will be driven at a greater rate of speed throughout half of a
100 revolution, than throughout the remaining half thereof, and it will be clearly seen that this movement on the part of the shaft 22 will, through the connections between said shaft and the rock shaft 25, cause the latter
105 to be rocked in one direction with greater speed than in a reverse direction. This movement becomes advantageous in a manner to be described.

Revolubly mounted on the eccentric portion 26 of the crank shaft 25 and at each
110 end thereof, is a sectional bearing 28 to

which longitudinal supporting bars 29 and 29' are rigidly secured, said bars 29 and 29' on the opposite sides of the machine being connected by transverse connecting bars 30.

5 Depending rigidly from the ends of the bars 29 and 29' are hanger bars 31 and 32 which are connected at their lower ends by longitudinal and transverse connecting bars 33 and 34. By so constructing the last mentioned parts, I produce a rigid frame which
10 is supported upon the eccentric portion of the crank shaft, the movement of which will be imparted to said frame.

The hanger bars 30 and 31 on the opposite sides of the machine, are provided with spaced openings 35 near their lower ends, said openings being provided for the reception of bolts 36 which pass removably there-
15 through and enter supporting plates 37 and 38 secured on the lower and upper ends respectively of the screening frames 39, 40 and 41, the lower end of the frame 39 overlying the hopper 10, the frame 40 overlying the hopper 11, and the frame 41 overlying
25 the hopper 12.

By mounting the screening frames in the manner described, it will be seen that they may be adjusted vertically and that their angular relation in respect to the other
30 hangers 31 and 32 may be varied. In order to vary said angular relation, it will be seen that provision must be made for lengthening or shortening the distances between the openings in the plates 37 and the points in the plates 38 through which the
35 bolts 36 pass. For this purpose, I have shown the plates 38 of greater length than the plates 37, and I have provided them with slots 42 which will overcome the above
40 mentioned difficulty.

Passing through the outer ends of the connecting bars 30 and supported therefrom by nuts 43, are front and rear bolts 44 and 45, the former being secured to the rear
45 hanger bars 31 by means of eye bolts 46, while the latter are secured to the forward hanger bars 32, near the extreme lower ends thereof, by eye bolts 47. The bolts 44 and 45 depend suitable distances beneath
50 the eye bolts 46 and 47 and are loosely surrounded, beneath said eye bolts, by eyes 48 carried on the inner ends of the links 49, the outer ends of said links being pivoted at
55 50 to the side walls of the tank 1. The links 49 are of approximately the same length as the distance between the axis of the crank shaft 25 and its eccentric portion 26 and thereby substantially the same movement
60 will be imparted to the lower end of the frame formed by the hanger bars 31 and 32 as that imparted to the upper end thereof by said crank shaft.

The ore to be separated, may be conveyed to the machine in any suitable manner, but I preferably provide each tank

1 with an inclined trough or chute 51 whose inner end may be connected to the hanger bars 32, so that it will move therewith, while its bottom 52 preferably carries a plurality of ore deflecting blocks 53 which
70 are designed to evenly distribute the ore over the screen of the top screening frame 39. In order to more rigidly support the chute 51, I provide the same with supporting shoes 54 which rest slidably upon the
75 upper edge of one of the side walls of the tank 1. The ore, upon falling from the inner end of the chute 51 is conducted through a transverse funnel 55 onto the screening surface of the frame 39, the funnel 55 being preferably supported by a
80 frame 56 formed of crossed longitudinal and transverse strips, which is supported in suitable guides 57 carried by the walls of the tank 1, said frame acting not only
85 as a support for said funnel, but also to prevent excessive splashing of the water within the tank when the machine is set in motion.

Some of the ore fed upon the screen of the top frame 39 will be sifted therethrough
90 onto the screen 40 which is of finer mesh than said screen 39, while the particles of ore too large to pass through the screen 39, will fall from its lower end into the hopper 10. The ore falling upon the screen 40 will
95 be sifted therethrough onto the screen 41, and such ore as may be too large to pass through the meshes of the screen 40, will fall into the hopper 11. Upon the screen 41, which is of extremely fine mesh, the ore
100 receives its final screening and the particles thereof sufficiently small to pass through the screen 41, will be discharged into the hoppers 6, while the particles too large to pass through said screen, will fall into the hop-
105 per 12. The outlet pipes 13 from the hoppers 10, 11 and 12, and the discharge pipe 14 from the hoppers 6, are provided at suitable points with valves (not shown) which prevent the discharge of water from the tank 1
110 until the proper time, when upon operation, they will discharge the water from said tank, as well as the various grades of ore which have been collected in the hoppers.

It may be here stated, that when ore is fed
115 to the machine, it is mixed with water, and that for the purpose of preventing the tank 1 from overflowing, I provide the same with a siphon discharge pipe 56, which, as will be clearly understood, will discharge some
120 of the water from the tank 1, as soon as the level thereof reaches a level above the top of said pipe. The operation of the device is as follows: The shaft 18 is first set in motion, whereupon, through the action of the eccentric
125 gears 20 and 21, the shaft 22 will be driven at a varied speed, as hereinbefore explained. This action will cause the arms 23 to rotate, and will, through the action of the connecting rods 27', rock the arms 27
130

on the ends of the rock crank shaft 25, and will thus impart a slight vertical and longitudinal reciprocating movement to the supporting frame of the screens 39, 40 and 41 and to the chute 51. The eccentric gears 20 and 21 are so positioned in respect to the crank shaft 25 as to cause said shaft to rock in such a manner as to force the screens toward the rear at a rather rapid rate of speed, while said screens will be returned toward the front of the machine rather slowly. The action of the water during the rearward movement of said screens will dislodge any particles of ore which may have clung within the meshes of the various screens and will force them considerable distances toward the front of the machine, the screens coming toward the front in ample time to prevent said particles of ore from falling directly into the hoppers 10, 11 and 12, and thus causing the same to be again screened. This operation tends to dislodge any particles from the various screens, but also breaks up lumps of ore which may have become stuck together by mud or the like.

When it becomes necessary to remove the screens and their frame for the purpose of repairing, the cap plates of the bearing 24, and the nuts 43 may be removed, thus allowing the entire screen supporting frame and the screens carried thereby to be lifted vertically within the tank, the length of the arms 23, 27 and the links 27' being of such length as to allow considerable vertical movement of said parts.

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

1. The combination of a water tank, a

crank shaft revolvably mounted on said tank 40 and extending thereacross, a substantially rectangular frame supported by said crank shaft, said frame having a pair of oppositely bowed cross bars at its opposite sides, a sectional bearing secured between each 45 pair of cross bars and through which the eccentric portion of said crank shaft passes, hanger bars rigidly secured to and depending from the corners of said frame, bars connecting the lower ends of said hanger 50 bars and thereby forming a rigid frame depending into the tank, screens adjustably mounted in said depending frame, and means for imparting movement to said frame. 55

2. In an ore concentrator, the combination of a water tank, a crank shaft revolvably mounted on said tank and extending thereacross, a frame mounted on said shaft and depending into said tank, screens carried by said frame and each having apertured plates secured to its opposite ends, the plates at one end being longer than those at the other end, said longer plates having 65 slots therein, said frame having a plurality of vertically spaced apertures for connection thereof to said screen carried plates, bolts for connecting said plates and frame, and means for imparting movement to said frame. 70

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

FRITZ OSCAR STROMBORG.

Witnesses:

L. EDWARD GLAS,
ERIC TIDESTROM.