

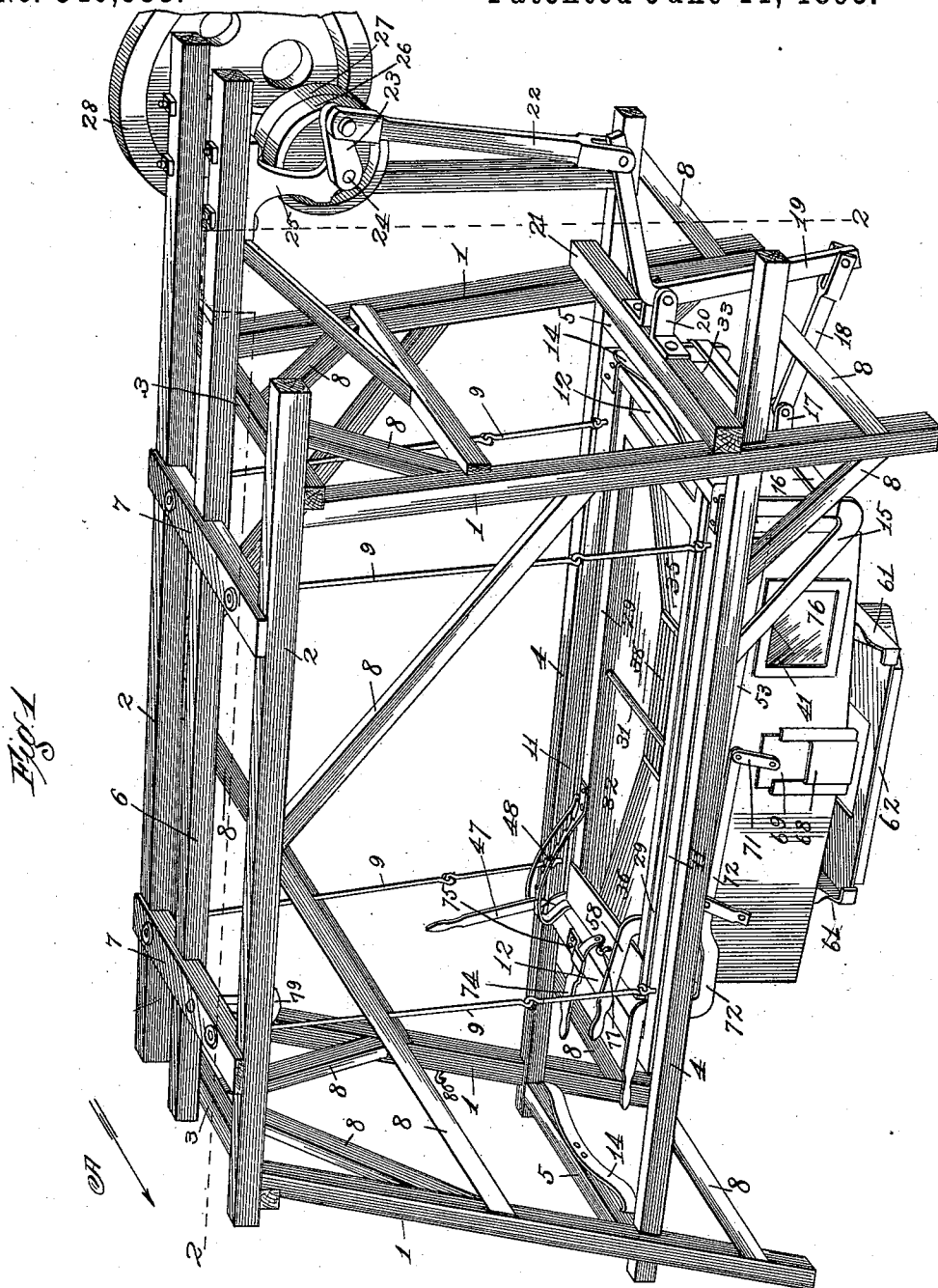
(No Model.)

2 Sheets—Sheet 1.

A. L. DANA.
ORE WASHER AND CONCENTRATOR.

No. 540,953.

Patented June 11, 1895.



Attest.
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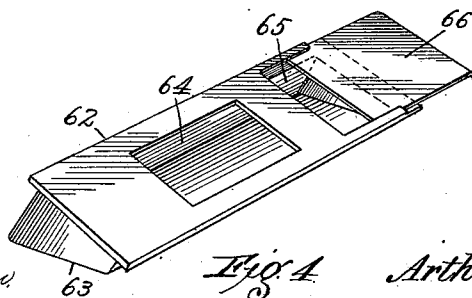
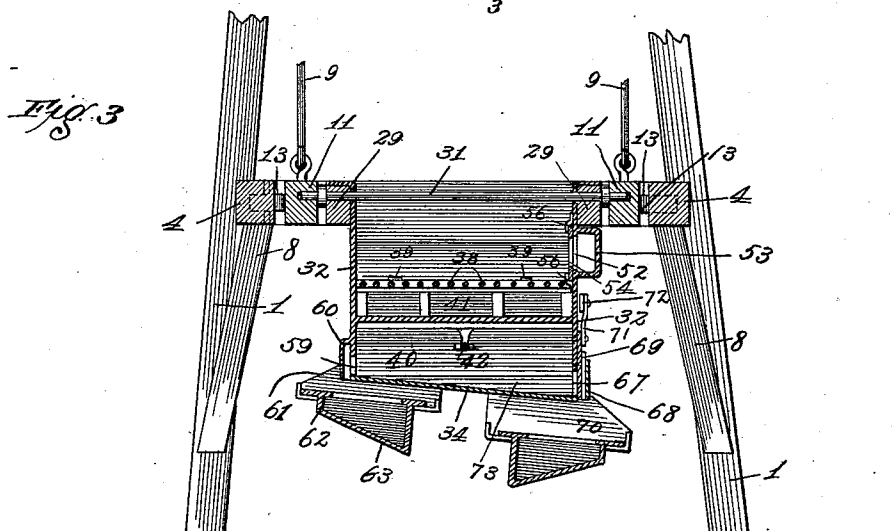
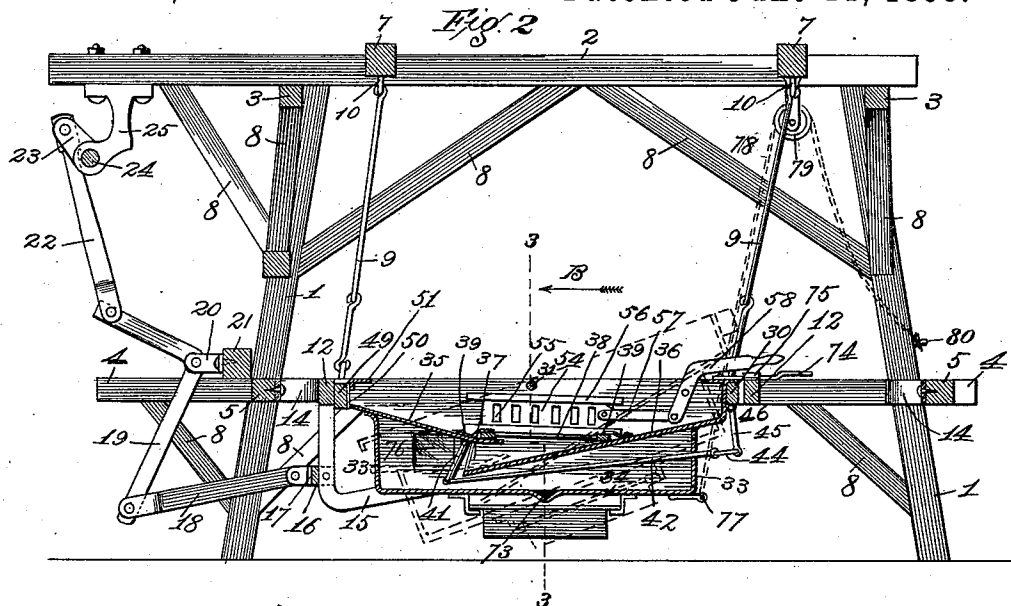
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2 Sheets—Sheet 2.

A. L. DANA.
ORE WASHER AND CONCENTRATOR.

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UNITED STATES PATENT OFFICE.

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ORE WASHER AND CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 540,953, dated June 11, 1895.

Application filed February 27, 1895. Serial No. 539,638. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR L. DANA, of the city of Roswell, El Paso county, State of Colorado, have invented certain new and useful Improvements in Ore Washers and Concentrators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to an improvement on the machine shown and described in my former United States Patent, No. 481,550, dated August 30, 1892, and it consists in the novel construction, combination and arrangement of parts, hereinafter specified and designated in the claims.

In the drawings, Figure 1 is a view in perspective of my complete machine. Fig. 2 is a longitudinal sectional view taken, approximately, on the indicated line 2 2 of Fig. 1 and looking in the direction indicated by the arrow A A, Fig. 1. Fig. 3 is a vertical cross-sectional view taken, approximately, on the indicated line 3 3 of Fig. 2 and looking in the direction as indicated by the arrow B, Fig. 2. Fig. 4 is a view in perspective of one of the boxes into which the ore is deposited after the same has passed through the concentrator.

Referring by numerals to the accompanying drawings, 1—1 indicate four upright posts, the same being framed together at their top ends by longitudinal timbers 2—2 and cross-timbers 3—3.

4—4 indicate parallel side timbers framed into the uprights 1 at points below the longitudinal centers of said uprights 1, and framed into these longitudinal timbers 4 at their ends are cross-timbers 5—5.

Located approximately half way between and extending parallel with the top longitudinal timbers 2—2 is a central timber 6, the same being fixed to and resting directly upon the end cross-timbers 3—3. This central timber 6 together with one of the timbers 2, extends a slight distance beyond the ends of the uprights 1 at one end of the frame, for a purpose which will be presently shown.

Transverse timbers 7—7 are framed into the parallel timbers 2—2 and timber 6 between the timbers 3—3. These timbers so located and held together by means of suitable

braces such as 8, constitute the frame work, whereupon the operative parts of my improved apparatus are supported and which will now be described.

Hung to swing between the side timber 4—4 of the apparatus by means of jointed rods 9—9 hooked at their top ends to eyes 10 that are fixed to the cross-timbers 7, is a rectangular oscillating frame comprising the side timbers 11—11 and end timbers 12—12. Anti-friction rollers 13 are positioned horizontally in the side timbers 4—4 and are adapted to engage the outer faces of the side timbers 11—11 of the oscillating frame and prevent any rubbing or friction that might otherwise ensue.

Rigidly fixed to the inner faces of the end cross-timbers 5 are leaf or bow springs 14, said springs being for the purpose of receiving the impact of the oscillating frame as the same reaches its limit of longitudinal movement. Fixed to one end of the oscillating frame and depending therefrom are metallic bars 15, the same having rigidly fixed near their lower ends, a transverse bar 16 from the center of which protrude ears 17. Between these ears 17 is pivoted the rear end of a link 18, the forward end of which is bifurcated and pivoted to the long arm of a bell-crank 19, the same being fulcrumed at the juncture of the long and short arm between a pair of ears 20 that are bolted rigidly to and extend laterally from a cross-timber 21 that is located upon the parallel side timbers 4 and adjacent two of the upright timbers 1. The upper end of the shorter arm of the bell-crank 19 is pivoted in the bifurcated lower end of an arm 22, the upper end of which is journaled upon the end of a crank 23 that is keyed upon one end of a transverse shaft 24, said shaft being journaled in bearings 25 that are bolted to the under sides of the timber 6 and side timbers 2—2 that extend beyond the end of the machine. Located upon this shaft 24 and between the bearings 25 are tight and loose pulleys, indicated by the numerals 26 and 27 respectively. Upon the outer end of the shaft 24 is fixed a balance-wheel 28, of any suitable form and size.

A frame comprising side timbers 29—29 and end timber 30 is located in the oscillating

frame previously described and is pivoted approximately at its longitudinal center by means of a transverse rod 31, that passes through the side timbers 29 and having its ends bearing in the side timber 11. A suitable receptacle depends from these side and end timbers, and is formed of sheet metal sides 32 and ends 33. The bottom 34 of this receptacle so formed is constructed of sheet metal and inclines from one side to the other. False bottoms 35 and 36 are constructed in this receptacle and incline from the center thereof to the ends 33, the inclined false bottom 36 extending to a point beyond the inner end of the false bottom 35, thereby forming a trap or passage 37 between the ends of said inclined false bottoms. Extending from the inclined false bottom 35 to the inclined false bottom 36 and lying in a horizontal plane, is a grating or screen 38, the same removably held in proper position by ears 39 fixed to the inclined false bottoms. By thus constructing the inclined false bottoms, a chamber 40 is formed between said bottoms and the true bottom 34 of the receptacle, said true bottom 34 as previously mentioned, inclining from one side to the other.

A transversely positioned plate 41 is hinged to the under side of the false bottom 35 adjacent the end thereof, and is adapted to close the passage 37 between the ends of the false bottoms 35 and 36. To the lower end of said plate 41 which performs the function of a valve, is pivoted a longitudinally extending rod 42 that passes through one of the end walls 33 of the receptacle, and is connected by means of a link 44 to the downwardly pending arm 45 of a crank 46, the same journaled in bearings fixed to the under side of the end timber 30 and extending to one side thereof. On the end of said crank 46 is rigidly fixed a hand lever 47 that operates in and is adapted to be engaged by the teeth of a segmental rack 48, the same being fixed to one of the side timbers 29 of the receptacle frame.

To the inner face of one of the end timbers 12 of the oscillating frame is fixed an auxiliary timber 49, that is sheathed with suitable packing 50 and is adapted to close the end of the receptacle opposite from the end-timber 30. A plate or tie-rod 51 connects the ends of the side timbers 29 and serves to retain the same in their proper positions.

Located in one of the side walls 32 just above the screen 38 is a series of apertures 52 that communicate from the interior of the receptacle with the interior of a rectangular tube 53 that is formed integral with and extends to one end of the receptacle.

A cut-off plate 54 is constructed with a series of apertures 55 of the same size as is the apertures 52, and said plate lies directly over the series of apertures 52 and moves longitudinally in suitable bearings 56 fixed to the inside of the wall 32. To one end of this cut-off plate 54 is pivoted one end of a link 57, the other end of which is pivoted to the lower

end of a hand lever 58, the same being fulcrumed to the side wall 32, and the handle of which extends outside the receptacle and where it may be conveniently reached.

Formed in the side wall 32 at the longitudinal center of the receptacle and adjacent the highest side of the inclined bottom 34 is a rectangular aperture 59 that is constructed with a suitable cover 60 on the outside of said wall 32.

Removably held in bearings 61 fixed to the under side of the inclined bottom 34 is a suitable receptacle 62, the same being preferably constructed of sheet metal, with the inclined bottom 63 and apertures 64 and 65 in its top. The aperture 64 is located directly beneath the aperture 59 in the lower end of the receptacle, and the aperture 65 is adapted to be closed by a sliding cover 66. In the side wall 32 directly opposite this rectangular opening 52 is a rectangular opening 67 that is constructed with a suitable cover 68, the same forming a guide for the vertically moving cut-off plate 69, that is adapted to normally close said opening or aperture 67. Directly beneath this opening 67 and located in bearings 70 in every way similar to the bearings 61, is a receptacle identical in form and size with the previously described receptacle 62. Pivoted to the upper end of the vertically moving plate 69 is a link 71, to the upper end of which is pivoted, the forward end of a hand lever 72, the same extending longitudinally along the side of the receptacle, and the handle of which is bent upwardly into a plane approximating that occupied by the handle of the fulcrumed hand-lever 58. A slight depression or groove 73 is formed transversely in the bottom 34 of the receptacle and extends from the opening 59 to the opening 67.

Pivoted to the top or in the longitudinal center of the end timber 30 is a horizontally moving hand-lever 74, that normally engages beneath a catch 75 that is rigidly fixed to the top side of the end timber 12 of the oscillating frame that is adjacent said end timber 30 of the receptacle frame. By means of this hand-lever which may be properly termed a lock lever, the receptacle frame and oscillating frame are rigidly held against vertical movement relative to one another.

If desired, a glazed opening such as 76 may be located in one side wall 32 of the receptacle, in order that the working and correct positioning of the valve or plate 41 may be at all times visible.

Secured to the under side and at one end of the receptacle is a hook 77 to which is attached one end of a rope or cable 78, the same passing upward over a pulley 79 swung from the under side of one of the cross-timbers 7, and extends from thence downwardly, and is attached to a hook 80 fixed in one of the upright posts 1. By means of this rope, the receptacle is tilted or swung to the position as shown by dotted lines in Fig. 2.

The operation of my improved ore washer

and concentrator is as follows: A driven belt passing over the tight pulley 27 imparts a rotary motion to the shaft 24, balance-wheel 28 and crank 23. The arm 22 being connected to the crank 23 at one end and to the bell-crank 19 at the other end, necessarily imparts movement to said bell-crank, and as the arm 18 is connected at one end to the bell-crank 19 and to the metallic bars 15 that depend from the oscillating frame, said frame will be moved backward and forward in a horizontal plane and between the end cross-timbers 5 5. At the end of each horizontal throw or movement of said oscillating frame, the end timbers 12 of said frame will impinge against the leaf or bow springs 14, and the resiliency of said springs will tend to throw the oscillating frame in a reverse direction from that in which it was moving when it engaged said springs. Any suitable means may be employed, whereby water is discharged into the receptacle. The ore or dirt is placed directly within the receptacle upon the inclined false bottoms 35 and 36 and the screen 38. After the receptacle and contents thereof have been oscillated or shaken for a stated length of time, the operator by means of the hand-lever 58 opens the side cut-off plate 54, which allows the lighter dirt, sand, &c., to pass through the coinciding apertures 55 and 52 and be discharged through the rectangular tube 53 at one end of the oscillating frame. The heavier particles of dirt, sand and mineral will pass through the grate 38 and will locate beneath said grate upon the inclined false bottom 36 and against the valve 41. Said valve 41 is now opened by manipulating the hand lever 47 in the ratchet-rack 48, and said mineral and heavier particles of dirt are allowed to pass into the chamber 40 and upon the bottom 34 of the receptacle. The continued oscillation or shaking, together with the action of the water causes the dirt, sand, &c., to pass off through the aperture 59. A certain amount of the lighter mineral will also pass through this opening and the same will by reason of its weight, gravitate downwardly and pass through the opening 64 of the receptacle 62 that is located immediately beneath said opening 59. The heavier mineral will by reason of its specific gravity, pass into the groove or channel 73 and gravitate toward the aperture 67 that is normally closed by the vertically arranged slide 69. When said slide 69 is raised by the action of the hand lever 72, said heavier mineral will pass immediately into the receptacle 62 that is located beneath said aperture 67. The mineral after passing into the receptacle 62, will by reason of its own weight, pass to the lowermost points or corners thereof, and at certain times during the washing out or concentrating of mineral with my improved means, said receptacles 62 are to be removed, the surplus dirt on the tops thereof washed out, leaving the free mineral in said receptacle. When it is desired to dump the matter from the receptacle that does not pass

through the screen 38, the operator throws the hand-lever 74 out of engagement with the catch 75, and pulls downwardly upon the free end of the rope or cable 78. This throws the receptacle into the position as shown by dotted lines in Fig. 2, and all larger particles of rock, dirt, &c., will pass from said receptacle.

If desired, quicksilver may be located in the receptacles 62 to collect the mineral falling therein, though this is not essential to the complete working of my device.

Slight changes in my apparatus may be resorted to, by any skilled mechanic, without departing from the spirit and scope of my invention.

Thus it will be seen how I have constructed an ore washer and concentrator, that possesses superior advantages in point of simplicity, durability and general efficiency.

What I claim is—

1. An ore washer and concentrator, comprising a rectangular frame, an oscillating frame mounted to swing in said frame, leaf or bow springs located at the ends of the frame and adapted to receive the impact of the swinging or oscillating frame, a receptacle pivoted within said oscillating frame, false bottoms for said receptacle, inclining in opposite directions toward the ends thereof, and a valve adapted to close the trap between the ends of said inclined false bottoms.

2. In an apparatus of the class described, a suitable frame work, a frame mounted for oscillation within said frame work, leaf or bow springs adapted to receive the impact of said oscillating frame, means for oscillating said frame, a receptacle pivoted within said oscillating frame, false bottoms for said receptacle inclining in opposite directions toward the ends thereof, a valve adapted to close the trap or passage between said inclined false bottoms, a hand-lever and connecting rods for operating said valve, and auxiliary receptacles held beneath the first mentioned receptacle, said auxiliary receptacles being constructed with inclined bottoms.

3. In an apparatus of the class described, the combination of a suitable receptacle, false bottoms for said receptacle inclining in different directions and toward the ends thereof, a valve closing the passage between said inclined false bottoms, a screen held upon said inclined false bottoms, a V-shaped groove or trough formed in the bottom of the receptacle, the same communicating with apertures in the side walls of said receptacle, and auxiliary receptacles constructed with inclined bottoms, removably held beneath the said apertures in the sides of the first mentioned receptacle.

4. In an apparatus of the class described, the combination of a frame work, a frame oscillating within said frame work, leaf or bow springs located at the ends of the frame work and adapted to receive the impact of the oscillating frame, suitable means for moving

said oscillating frame, a receptacle pivoted within said oscillating frame, inclined false bottoms for said receptacle, a screen located upon said inclined false bottoms, a valve for
5 closing the passage between the ends of the inclined false bottoms, a hand-lever and rod connections for operating said valve, an inclined groove or trough formed in the bottom of the receptacle and communicating with
10 apertures or openings in the side walls there-

of, and auxiliary receptacles constructed with inclined bottoms, removably held beneath the apertures in the side walls of the first mentioned receptacle.

In testimony whereof I affix my signature 15
in presence of two witnesses.

ARTHUR L. DANA.

Witnesses:

FRED L. CRISSEY,
THOMAS ORD.