

(No Model.)

3 Sheets—Sheet 1.

G. M. WHITNEY.
CONCENTRATOR.

No. 582,408.

Patented May 11, 1897.

Fig. 1.

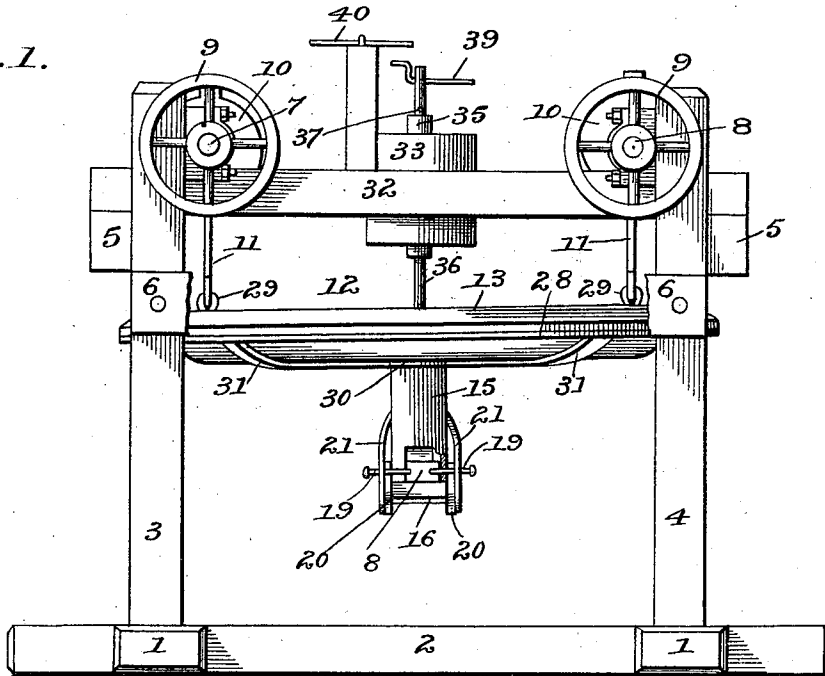
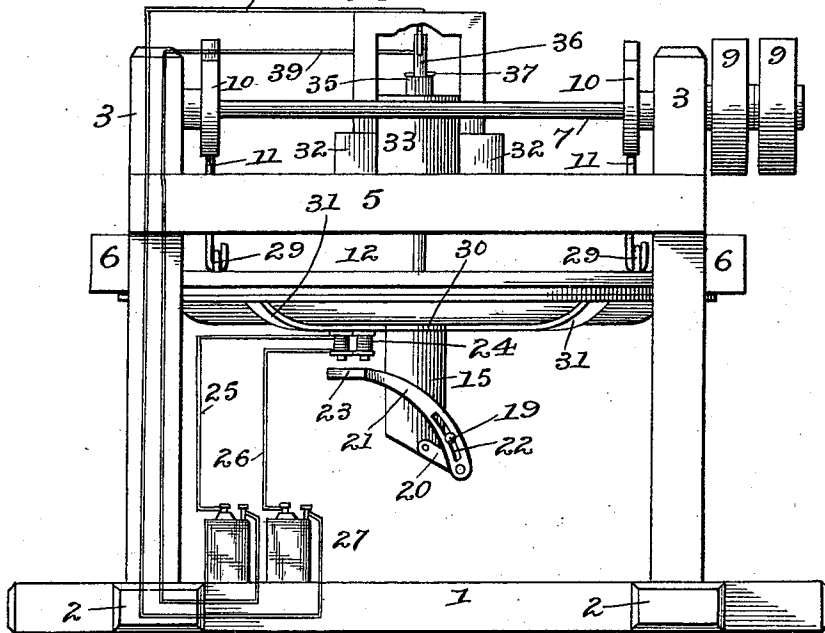


Fig. 2.



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Fig. 3.

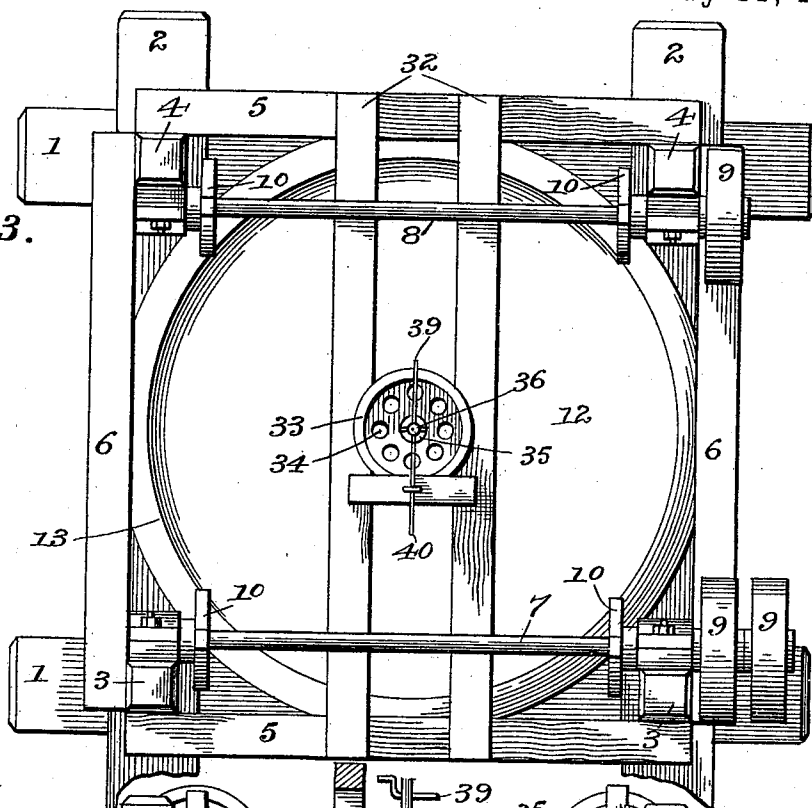
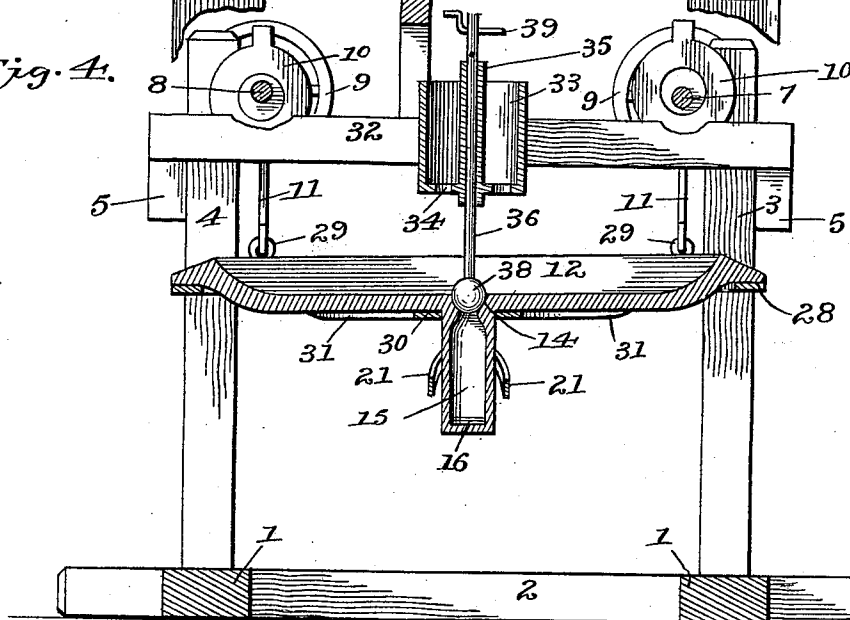


Fig. 4.



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Fig. 5.

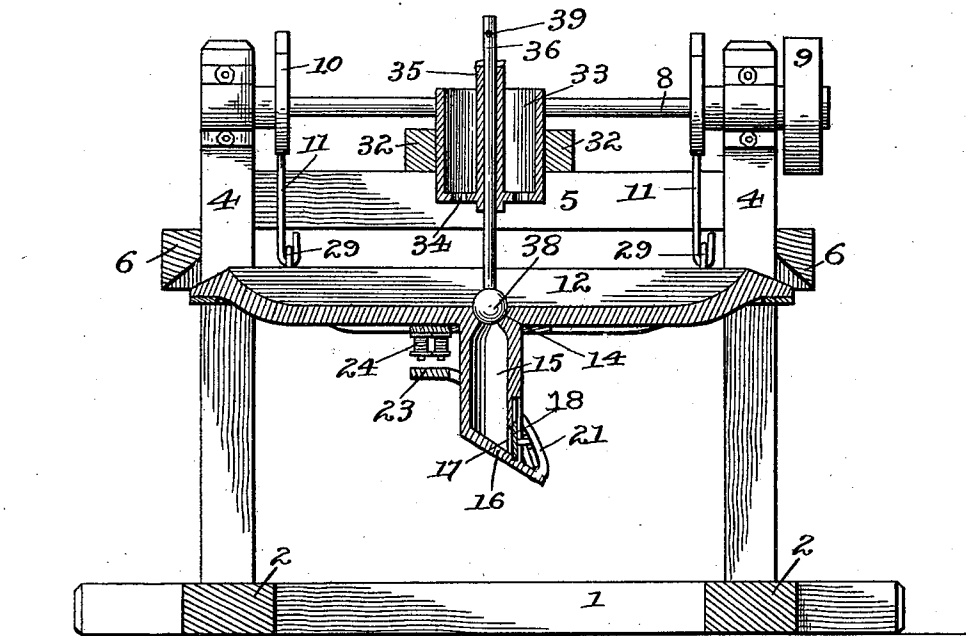
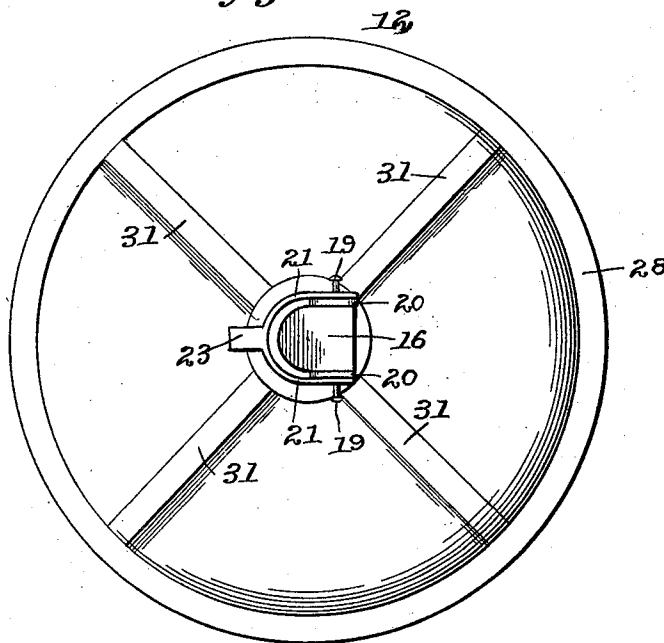


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE M. WHITNEY, OF LAWSON, COLORADO.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 582,408, dated May 11, 1897.

Application filed June 22, 1896. Serial No. 596,482. (No model.)

To all whom it may concern:

Be it known that I, GEORGE M. WHITNEY, a citizen of the United States, residing at Lawson, in the county of Clear Creek and State of Colorado, have invented certain new and useful Improvements in Concentrators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in ore-concentrators, the object of the same being to provide a device for concentrating the ores of the precious metals in which no metal that lowers the value of the concentrates is present.

A further object of the same is to provide a device for the purpose which is cheap in construction, will concentrate the ores at a minimum cost, and is effective in operation, at the same time being provided with means for automatically discharging the concentrated ore from the lower end of a shaking-pan.

The invention consists of a frame made up of uprights and cross-beams connecting said uprights, shafts mounted in bearings in the upper ends of said uprights, means for rotating said shafts, a concentrating-pan having an opening and a discharge-spout leading outwardly from the central point thereof, connections between said shafts and said pan, whereby a rocking or shaking motion is imparted thereto, a sliding gate or cut-off in the lower end of said discharge-spout, an electromagnet, an armature therefor connected through intermediate mechanism with said cut-off, a battery and circuit-wires leading from said battery to said electromagnet, a catch-basin, into which the sluice leads, having a series of openings in the bottom thereof, an upright tube extending through said basin and projecting slightly beyond the upper and lower ends, a vertically-reciprocable rod, passing through said tube, having a ball upon its lower end, the specific gravity of said ball and rod being greater than the quartz and rock, but less than the mineral, a wire leading from the battery to the upper end of said rod, and a second wire with which said rod is adapted to make contact upon its upward stroke.

The invention also consists in other details

of construction and combinations of parts, which will be hereinafter more fully described and claimed.

In the drawings forming part of this specification, Figure 1 represents a front elevation of my improved concentrator. Fig. 2 is a side elevation of the same. Fig. 3 is a top plan view. Fig. 4 is a vertical central section through the same. Fig. 5 is a similar view at right angles thereto. Fig. 6 is a bottom plan of the concentrating-pan.

Like reference-numerals indicate like parts in the different views.

The framework of my device is made up of horizontal, longitudinal, and cross beams 1 2, uprights 3 4, rising therefrom, and longitudinal and cross beams 5 6, connecting said uprights near their upper ends.

Mounted in suitable bearings near the upper ends of the uprights 3 4 and connecting the same in pairs are horizontal shafts 7 8, provided with drums or pulleys 9 upon their outer ends, by means of which they may be rotated from any suitable source of power. Connected to eccentric-straps 10 10 upon the shafts 7 8 are connecting-rods 11 11, which are attached to the upper side of a concentrating-pan 12, located between the uprights 3 4. This pan has a flaring rim 13 extending around the outside thereof and increases in depth from the sides to the center. At its central point it has a discharge-opening 14, beneath which extends a tubular spout 15, with an inclined lower end 16 and provided with an opening 17 in its longer side, as clearly shown in Fig. 5. Moving in suitable guide-ways adjacent to the opening 17 is a gate or cut-off 18, having arms 19 19 extending laterally therefrom.

Pivoted to the lower end of the spout 15 are links 20, to the outer ends of which are attached rods or bars 21, having slots or openings 22 therein, through which project the arms 19 on the gate 18. The rods 21 pass around the sides of the spout 15 and have connected to their rear ends an armature 23 of an electromagnet 24, located upon the under side of the pan 12 and connected through circuit-wires 25 and 26 with an electric battery 27. On the under side of the pan 12, extending around the outer edge or rim thereof, is a metallic ring 28, through which bolts 29

pass, to which the connecting-rods 11 are attached. A similar ring 30 of smaller diameter may be secured to the under side of the pan 12 adjacent to the discharge-opening 14 therein, and the two rings 28 and 30 may be connected by radially-extending bars or strips 31, as clearly shown.

Secured to suitable supporting-beams 32 32, connecting the longitudinal beams 5 5, is a catch-basin 33, into which the sluice leads, the said basin having a series of perforations or openings 34 34 in its bottom. Located centrally of the basin 33 and extending slightly above and below the upper and lower ends, respectively, of said basin is a tube 35, in which fits a vertically-reciprocable metallic rod 36, whose downward movement is limited by a pin 37, projecting laterally therefrom and engaging the upper end of the tube 35. Upon the lower end of the rod 36 is attached a ball 38, resting just above the discharge-opening 14 in the concentrating-pan 12, the said rod and ball being constructed of such metal or alloy that its specific gravity will be slightly greater than that of the rock or quartz, but less than the mineral contained therein. The exact specific gravity desired may be obtained by forming the ball 38 hollow originally and filling the opening therein to a greater or less extent with a metal or alloy having a specific gravity less than the rock or quartz.

To the upper end of the rod 36 is permanently connected a circuit-wire 39, leading from the battery 27, and the said rod is also adapted to make contact with a wire 40 when it rises to the limit of its upward movement, thereby closing the circuit through the battery 27, wires 39 and 40, and wires 25 and 26, leading to the electromagnet 24, the said wires 25, 26, 39, and 40 being connected in series with the different cells of which the battery 27 is made up.

The operation of my device is as follows: The rock and quartz containing the precious metals is fed from the sluice into the catch-basin 33 and passes through the openings 34 in the bottom thereof to the concentrating-pan 12. Power being then applied to the shafts 7 8 transmits a rocking or shaking motion to said concentrating-pan and causes the heavier particles of the metal to sink or be precipitated to the bottom of said pan. During this operation the gate or cut-off 18 lies across the opening 17 at the lower end of the discharge-pipe 15 and holds the crushed ore in the pan 12. As the material is separated into different strata the ball 38 upon the lower end of the rod 36 sinks down through the rock or quartz and rests upon the layer of mineral at the bottom of the pan. As the stratum of mineral rises, however, it carries with it the ball 38 and raises the rod 36, so that contact is made between the upper end of said rod with the circuit-wire 40, closing the electric circuit through the battery 27, wires 39, 40, and 26, through the electromagnet 24 and wire 25, back to the battery. This

energizes the electromagnet 24 and the armature 23 thereof is attracted to it. When said armature rises, it elevates the rods or bars 21, attached to the links 20, and by reason of the engagement of the arms 19 with the edges of the slots 22 elevates the gate or cut-off 18 and releases the concentrates through the opening 17 in the spout 15. As the concentrates flow out of the pan 12 the rod 36 and ball 38 drop by gravity, thereby breaking the circuit which was closed between the upper end of said rod and the circuit-wire 40, deenergizes the magnet 24, and permits the gate or cut-off 18 to fall, closing the opening 17 and preventing a further discharge of the material contained in the concentrating-pan until additional concentrates have been formed.

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

1. In an ore-concentrator, the combination with a concentrating-pan and means for shaking the same, of a discharge-spout on the under side of said pan, having an opening therein, a gate mounted in suitable guides for regulating said opening, an electromagnet, an armature therefor connected through intermediate mechanism with said gate, an electric battery, a normally open circuit between said battery and said magnet and means, actuated by the rise of the concentrates in said pan, for closing the circuit through said magnet, substantially as and for the purpose described.

2. In an ore-concentrator, the combination with a concentrating-pan and means for shaking the same, of a discharge-spout leading therefrom and having an opening therein, a slidingly-mounted gate for regulating said opening, arms on said gate, links pivoted to the lower end of said spout, an electromagnet located upon the under side of said pan, an armature therefor, rods or bars connecting said armature with said links and provided with slots or openings therein through which project the arms on said gate, an electric battery, a normally open circuit between said battery and said magnet and means, actuated by the rise of the concentrates in said pan, for closing the circuit through said battery, substantially as and for the purpose described.

3. In an ore-concentrator, the combination with a concentrating-pan and means for shaking the same, of a discharge-spout leading therefrom having an opening near its lower end, a gate for regulating said opening, an electromagnet and intermediate connections between said magnet and said gate, an electric battery, a normally open circuit between said battery and said magnet, a vertically-reciprocable rod having a ball or bulb upon its lower end which lies within the crushed material in said concentrating-pan, whose specific gravity is greater than the rock or quartz but less than the mineral contained therein, a wire leading from said battery to

said rod and a wire with which said rod is adapted to make contact when the same is elevated to the limit of its upward stroke, whereby a circuit is closed through said electromagnet, the gate controlling the opening in said spout is opened and the concentrates contained in said pan are discharged, substantially as described.

4. In an ore-concentrator, the combination with a concentrating-pan and means for shaking the same, of a discharge-spout leading therefrom, having an opening near its lower end, a gate for controlling said opening, an electromagnet, and intermediate connections between said magnet and said gate, an electric battery, a normally open circuit between said battery and said magnet, a catch-basin permanently secured above said concentrating-pan, having a series of openings in the bottom thereof, a tube extending through said

basin, a vertically-reciprocable rod fitting within said tube, having a ball or bulb upon its lower end whose combined specific gravity is greater than the rock or quartz contained in the crushed ore in said pan but is less than that of the mineral therein, a wire connecting said battery with the upper end of said rod and a second wire leading from said battery with which said rod is adapted to make contact when it is elevated to the limit of its upward stroke, substantially as and for the purpose described.

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

GEORGE M. WHITNEY.

Witnesses:

W. L. STEVENS,
W. H. MAXTON.