

UNITED STATES PATENT OFFICE.

JOHN H. PEMBERTON, OF LOS ANGELES, CALIFORNIA.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 401,457, dated April 16, 1889.

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To all whom it may concern:

Be it known that I, JOHN H. PEMBERTON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Ore-Concentrators, of which the following is a specification.

My invention relates to an improvement in ore-concentrators; and it consists in the peculiar construction and combination of devices that will be more fully set forth hereinafter, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of an ore-concentrator embodying my improvements. Fig. 2 is a vertical longitudinal sectional view of the same. Fig. 3 shows a modified form of my invention. Fig. 4 is a top plan view, portions being broken away.

A represents the parallel sills of the frame, which are connected at their front and rear ends by cross-beams B and near their centers by a beam, C.

D represents a pair of vertical standards which rise from the sills near the rear ends thereof and have their upper ends connected by a horizontal cross-bar, E. At a suitable distance from their lower ends the said standards are connected by a cross-beam, F.

G represents a pair of vertical standards which rise from the sills at a suitable distance in front of the standards, and are connected by a cross-beam, H, and a similar beam, I, connects them at a point below the beam H.

K represents a pair of inclined brace-beams, the lower front ends of which are bolted to the front upper sides of the sills, and the rear upper ends of which are bolted to the standards D. The central portions of the inclined braces are bolted to the standards G.

L represents a horizontal beam, which connects the central portions of the inclined braces and is arranged above and in line with the beam C. An arched beam, M, connects the brace-beams near their rear upper ends, the upper side of the said arched beam being slightly higher than the upper side of beam F. From the rear side of the beam L, at the center thereof, depends a vertical hanger, N.

O represents a vertically-movable standard,

the lower portion of which is squared and passed through square central openings in the beams C and L. The upper portion of the standard O is bifurcated to form forked arms P, between which is secured a funnel-shaped hopper, R, having a discharge opening or nozzle, S, in its lower end. A lever, T, is fulcrumed in the lower end of the hanger, and has its front end inserted in an opening near the lower end of the standard O, and on the rear projecting arm of this lever is supported a sliding weight, U.

V represents a coiled retractile spring, which has its upper end attached to the rear end of the lever and its lower end attached to the beam B.

In the standards D are journaled sheaves W, over which pass ropes or chains X. The inner ends of these ropes or chains are attached to the standard O, and to their outer ends are attached weights Y, which serve to partly sustain the weight of the hopper and its supporting-standard.

Z represents a vertical shaft, which is journaled in bearing-blocks secured to the centers of the beams H and I, and the lower end of which extends downward into the hopper, the said shaft being in vertical alignment with the center of the hopper. The lower portion of the shaft Z has a series of radiating horizontal stirring-arms, A', that extend outward to within a slight distance of the sides of the hopper. This shaft and its arms constitute an agitator, the purpose of which is to keep the contents of the hopper thoroughly stirred. From the upper end of the shaft Z extends a crank-arm, B'.

C' represents a vertical shaft, which is journaled in bearing-boxes attached to the cross-beams E and F of the frame. To this shaft is rigidly secured a miter gear-wheel, D', that meshes with a miter-pinion, E', on a horizontal driving-shaft, F', having a pulley for a driving-belt. The upper end of the shaft C' has a crank-arm, G', which is shorter than the crank B' and is connected to the latter by a pitman, H'.

From the foregoing description it will be readily understood that the rotary motion of the driving-shaft will be imparted to the shaft C', and that the cranks and pitman will

cause the agitator to be turned or oscillated first in one direction and then in the contrary direction in the hopper, so as to thoroughly stir the concentrates therein.

5 I' represents a valve, which is conical in shape and adapted to fit snugly in the discharge-opening in the bottom of the hopper. This valve is swiveled to the lower end of the agitator, so that the latter may oscillate with-
10 out turning the valve, and thereby enable the valve to normally rest in the discharge-opening of the hopper and close the same.

The operation of my invention is as follows: The slums are allowed to flow from the
15 battery into the hopper, and the weight U is placed at such a point upon the balance beam or lever T that when the hopper is filled with slums a certain amount of concentrate will be sufficient to overcome the resistance of the
20 spring V and raise the weight U, thus allowing the hopper to sink downward from the valve, thereby causing the latter to open the discharge-opening and permit the concentrate to escape. Power being applied to the band-
25 pulley causes the agitator to turn first in one direction and then in the contrary direction in the hopper, as before described, thereby disturbing the slums and preventing them from packing, thus allowing the heavier min-
30 erals to sink to the bottom of the hopper, while the lighter portions of the slums flow off around the rim thereof. The concentrate in the bottom of the hopper, being below the stirring-arms of the agitator, will not be dis-
35 turbed thereby, but will gradually settle down and pass out as the accumulation goes on, and prevent the flow of water through the discharge-opening in the bottom of the hopper.

In Fig. 3 I illustrate a modified form of my
40 invention, in which I employ a bar, a, which is attached to the beam F, rests on the arched beam, and supports the valve at its front end against vertical movement in the discharge-opening of the hopper, the valve being in this
45 instance disconnected from the agitator. Other means may be employed for securing the valve against vertical movement without departing from the spirit of my invention.

Having thus described my invention, I
50 claim—

1. In an ore-concentrator, the combination of the vertically-movable hopper having the

discharge-opening in its lower end, the agitator secured against vertical movement, and the stationary valve attached to the agitator
55 and normally closing the discharge-opening of the hopper, substantially as described.

2. In an ore-concentrator, the combination of the vertically-movable conical hopper hav-
60 ing the discharge-opening, the agitator arranged in the hopper and adapted to rotate therein, said agitator being secured against vertical movement, and the conical valve swiveled to the lower end of the agitator and adapted to close the discharge-opening in the
65 hopper in the normal position of the latter, and means for moving the hopper and agitator, substantially as described.

3. In an ore-concentrator, the combination of the vertical frame-work provided with the
70 guide-bars, a standard playing in said guide-bars, a hopper secured to said standard, the valve stationary against vertical movement for closing the lower end of the hopper, an agitator connected to said valve, and counter-
75 balancing devices for effecting the vertical movement of the hopper and its standard to open its lower end, substantially as described.

4. In an ore-concentrator, the combination of the vertical frame-work provided with the
80 guide-bars, a standard playing in said guide-bars, a hopper secured to said standard, a stationary valve at the lower end of said hopper, a balance beam or lever, T, pivoted, as described, to elevate said hopper, cords con-
85 nected to said yoke-frame and passing over sheaves in the main frame, and weights connected to said cords, substantially as described.

5. In an ore-concentrator, the combination
90 of the vertically-movable conical hopper having the discharge-opening, and the conical valve adapted to close the said discharge-opening in the normal position of the hopper, and the agitator within the hopper, both the
95 valve and the agitator being held against vertical movement, as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JOHN H. PEMBERTON.

Witnesses:

JOHN H. BOOK,

ALBERT M. THORNTON.