

(No Model.)

C. J. PAINE.  
ORE CONCENTRATOR.

No. 370,646.

Patented Sept. 27, 1887.

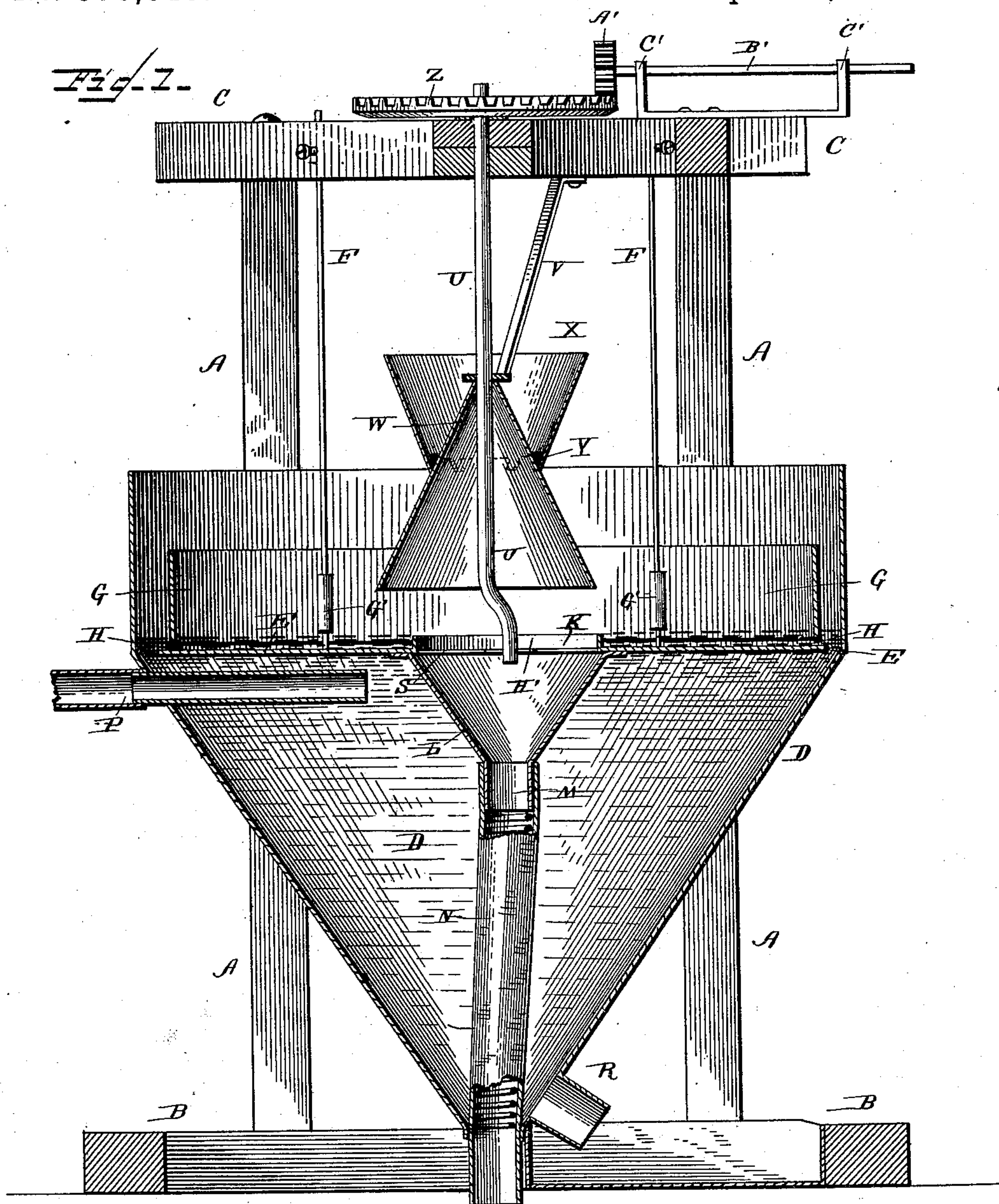


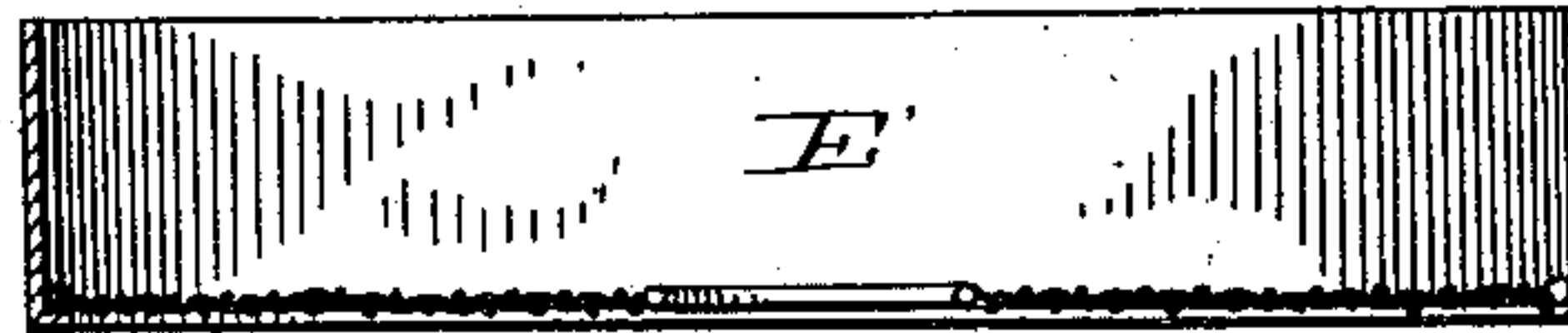
Fig. 2.



WITNESSES

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Fig. 3.



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# UNITED STATES PATENT OFFICE.

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## ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 370,646, dated September 27, 1887.

Application filed March 7, 1887. Serial No. 230,001. (No model.)

*To all whom it may concern:*

Be it known that I, CLINTON J. PAINE, a citizen of the United States, residing at Wakonda, in the county of Clay, Dakota Territory, have invented certain 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 skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to certain improvements in concentrators for separating and amalgamating ores; and it has for its objects to provide a machine that will effectually separate the different classes of ores either by washing or by amalgamation in an effective and economical manner, as more fully hereinafter specified, and pointed out in the claims.

The above-mentioned objects I attain by the means illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical sectional view of my improved concentrator complete; Fig. 2, a sectional view of an amalgamating-pan to be used in connection therewith, and Fig. 3 a sectional view of a modification of the amalgamating-pan to be used in the treatment of certain varieties of ores.

The letter A indicates an upright rectangular frame of timber erected upon a rectangular base, B, of similar material, the upper ends of the upright timbers being connected by cross-bars C, which intersect directly above the vertical center of the machine, for the purpose hereinafter explained.

The letter D indicates a metallic shell located within and supported by the frame in any suitable manner, the said shell being preferably constructed of heavy galvanized iron, the lower part being in the form of an inverted cone and the upper part cylindrical, as shown in Fig. 1 of the drawings. Within the cylindrical portion of the shell, at the juncture thereof with the cone, is suspended a vibrating plate, E, by means of a series of flexible steel rods, F, fastened at their lower ends to the

plate and at their upper ends adjustably to the cross-bars C. The upper part of the vibrating plate at its edge is provided with a vertical rim, G, which is adjustable vertically, so as to leave a space, H, between the two, which may be varied by suitable devices. The rim in the present instance is loosely secured to the vertical rods F by means of sleeves G'; but other means may be adopted for the purpose.

The plate is provided with a central aperture, H', having an annular upwardly-extending flange, K, and from the lower part of the plate extends a central inverted conical shell, L, which has a tubular extension, M, at its lower end, connecting with a tube passing through the lower end of the shell D by means of a flexible tube, N, of rubber or other suitable material, re-enforced by an internal spiral spring, which keeps it distended and prevents undue wear, while at the same time it does not impair its flexibility. The shell D at one side, near the top, is provided with a water-induction tube, P, which terminates on the inside, near the bottom of the plate E, and near the bottom of the shell is a discharge-opening, R, for the purpose hereinafter explained. Across the opening at the center of the plate E is a cross-bar, S, having a central aperture in which fits loosely the lower end of a vertical crank-shaft, U, having bearings at the intersecting portions of the cross-bars C, before mentioned, and in a hanger, V, depending therefrom.

To the straight portion of the shaft U is secured a conical shell, W, the lower portion of which is over the raised flange K, and setting upon the upper part of the said shell W is a conic frustum, X, inverted, and having at its lower edge a series of openings, Y. The said frustum constitutes the hopper of the machine, which receives the pulp from the stamping-mills through any suitable conduit.

To the upper end of the shaft U is secured a crown-wheel, Z, with which intergears a cogged pinion, A', mounted on a driving-shaft, B', journaled in bearings C', secured to the upper part of the frame of the machine.

The letter D' indicates a copper pan having a raised outer rim and a central flanged aperture which can be substituted for the vibrat-



ing plate for amalgamating purposes, and E' a pan having a foraminous bottom to be substituted for said plate, when the machine is to be used for placer washing.

5 The operation of my invention is as follows: The stamped ore mixed with a suitable quantity of water is run into the hopper and flows out through the apertures at the bottom thereof onto the outer surface of the distributing conical shell. This shell, being constantly rotated, 10 evenly and uniformly distributes the ore onto the vibrating plate, outside of the raised central flange thereof. The said plate is vibrated by the crank-shaft U, which also gives motion to the distributing-cone, the said shaft receiving its motion through the medium of the crown-gearing and intermeshing pinion on the driving-shaft. The shaft gives a vibratory 20 motion to the plate while it is receiving the distributed ore, which causes the heavier metallic portions to work toward the edge of the plate. Water is admitted through the water-conduit in sufficient volume to rise in the outer conical shell and overflow the plate and the central flange, K. The water thus overflowing the plate washes the silicious portion or lighter parts of the ore out through the 25 central aperture of the machine, while the heavier or metal-laden portions pass through the aperture between the lower edge of the outer rim and outer edge of the plate into the cone below, where they collect and are finally discharged into the receiving-pan. 30

When used as an amalgamator, the concentrating-rim is removed from the vibrating 35 plate and the copper pan substituted, and a suitable quantity of mercury is placed in the bottom thereof. The metallic portions of the ore in this case unite with the mercury, forming an amalgam, instead of passing over into the outer cone shell, while the silica washes out at the center of the pan, as before mentioned. 40

For placer washing, the vibrating plate is 45 covered with burlaps or other equivalent ma-

terial, so that the water in rising through said bottom washes the lighter portions of the ore through the central aperture, the heavier portions collecting on the bottom of the pan.

Having thus described my invention, what I 50 claim, and desire to secure by Letters Patent, is—

1. The combination, in an ore-separator, of the outer conical shell having separate openings for the light and heavy particles of the 55 separated ore, respectively, the vibrating plate having a flanged opening in the center, and the adjustable rim secured to the said vibrating plate, the rotating distributor and hopper, and the water-induction pipe, substantially as 60 described.

2. The combination of the vibrating plate, flexible rods supporting said plate, the crank-shaft and its gearing, the rotating hopper and distributor, the outer shell having induction 65 and eduction passages, and the flexible connecting-pipe between said plate and eduction-passage, substantially as described.

3. The combination of the outer shell provided with suitable induction and eduction 70 passages, the vibrating plate having a central flanged opening, and flexible pipe connecting the said central opening in the vibrating plate with one of the eduction-passages, substantially as herein set forth. 75

4. The combination of the outer shell provided with suitable induction and eduction passages, the vibrating plate, the adjustable rim secured to the said vibrating plate, flexible rods supporting said plate, the hopper, 80 and distributor, and means, substantially as described, for vibrating said plate, substantially as described.

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

CLINTON J. PAINE.

Witnesses:

FRANK W. MOORE,  
W. F. MAYER.