(No Model.) 2 Sheets—Sheet 1.

L. M. KELLOGG.

Ore Concentrator.

No. 231,330. Patented Aug. 17, 1880.

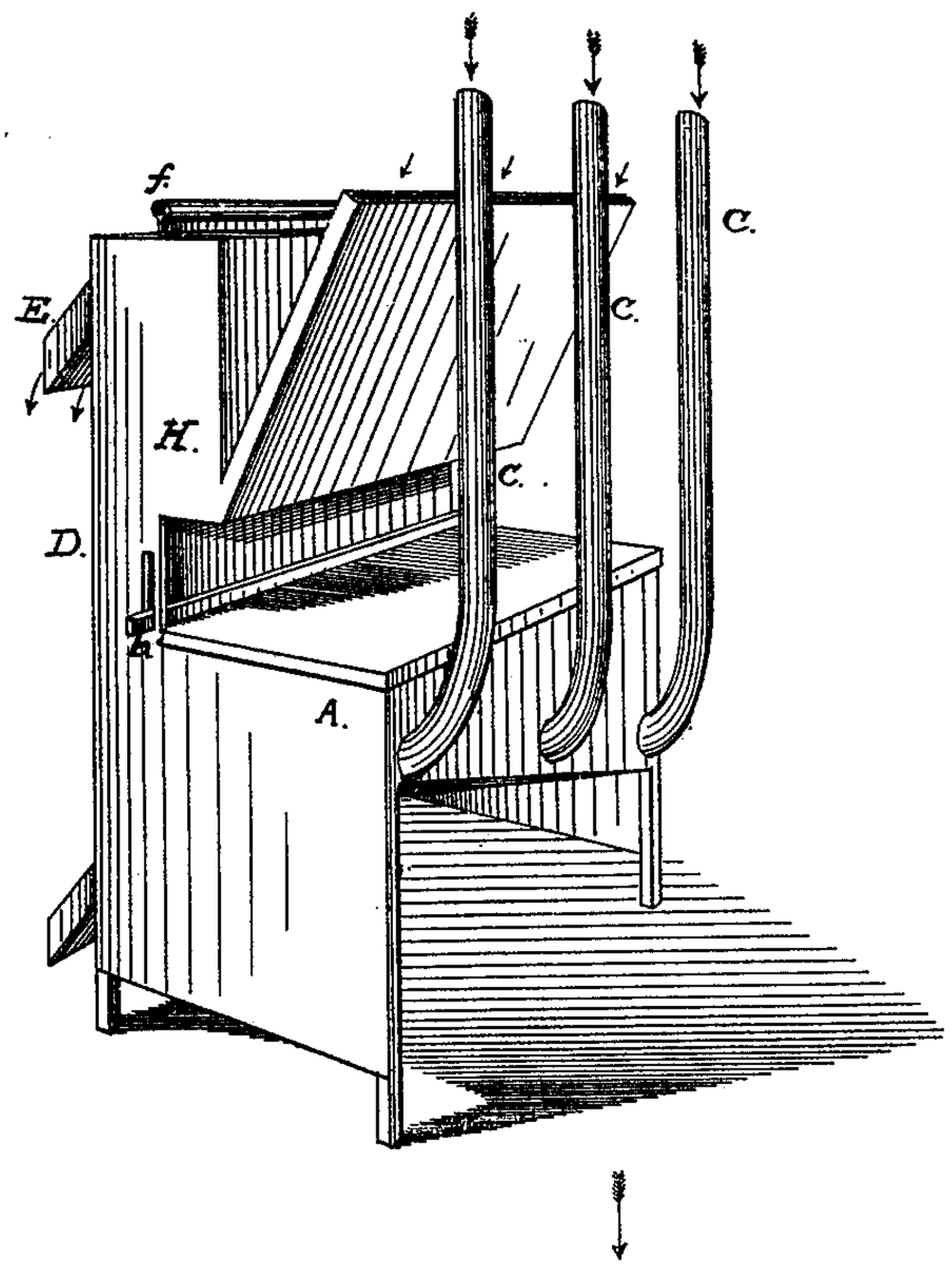

Fig. 1

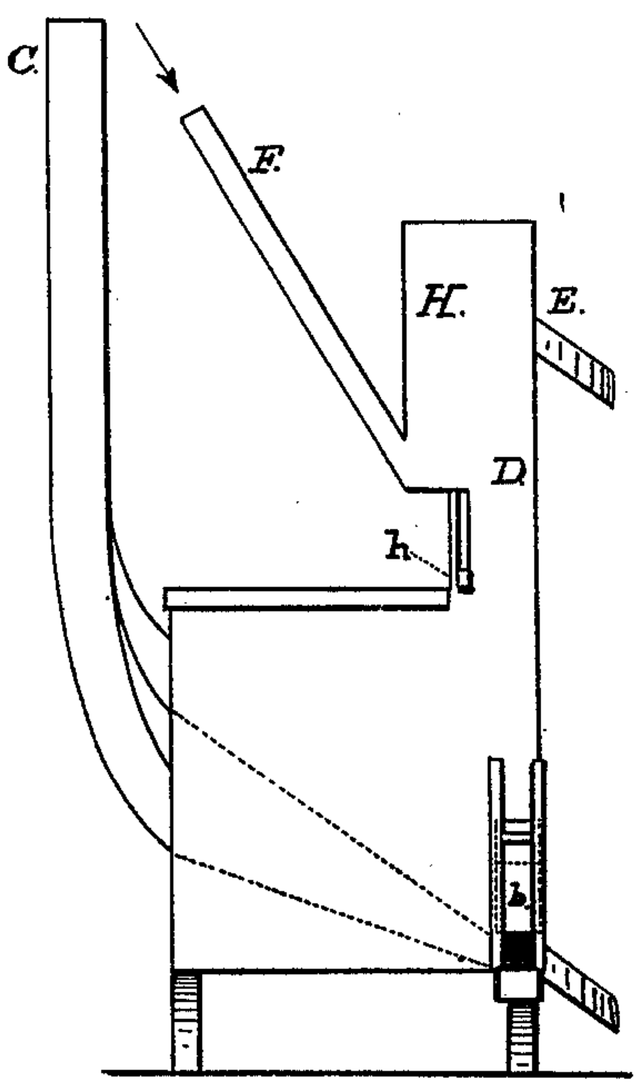

Fig. 2

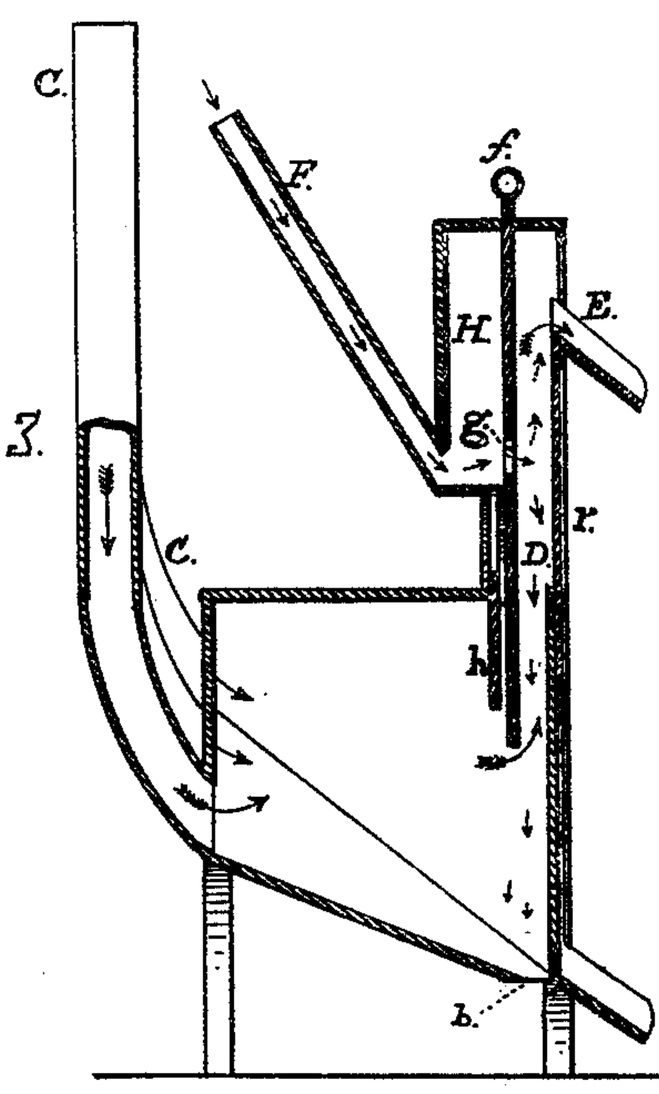

Fig. 3.

Witnesses:

Jno. L. Boone

Wm. F. Clark

Inventor:

Lewis M. Kellogg

by his Attys

Boone & Odell

(No Model.) 2 Sheets—Sheet 2.

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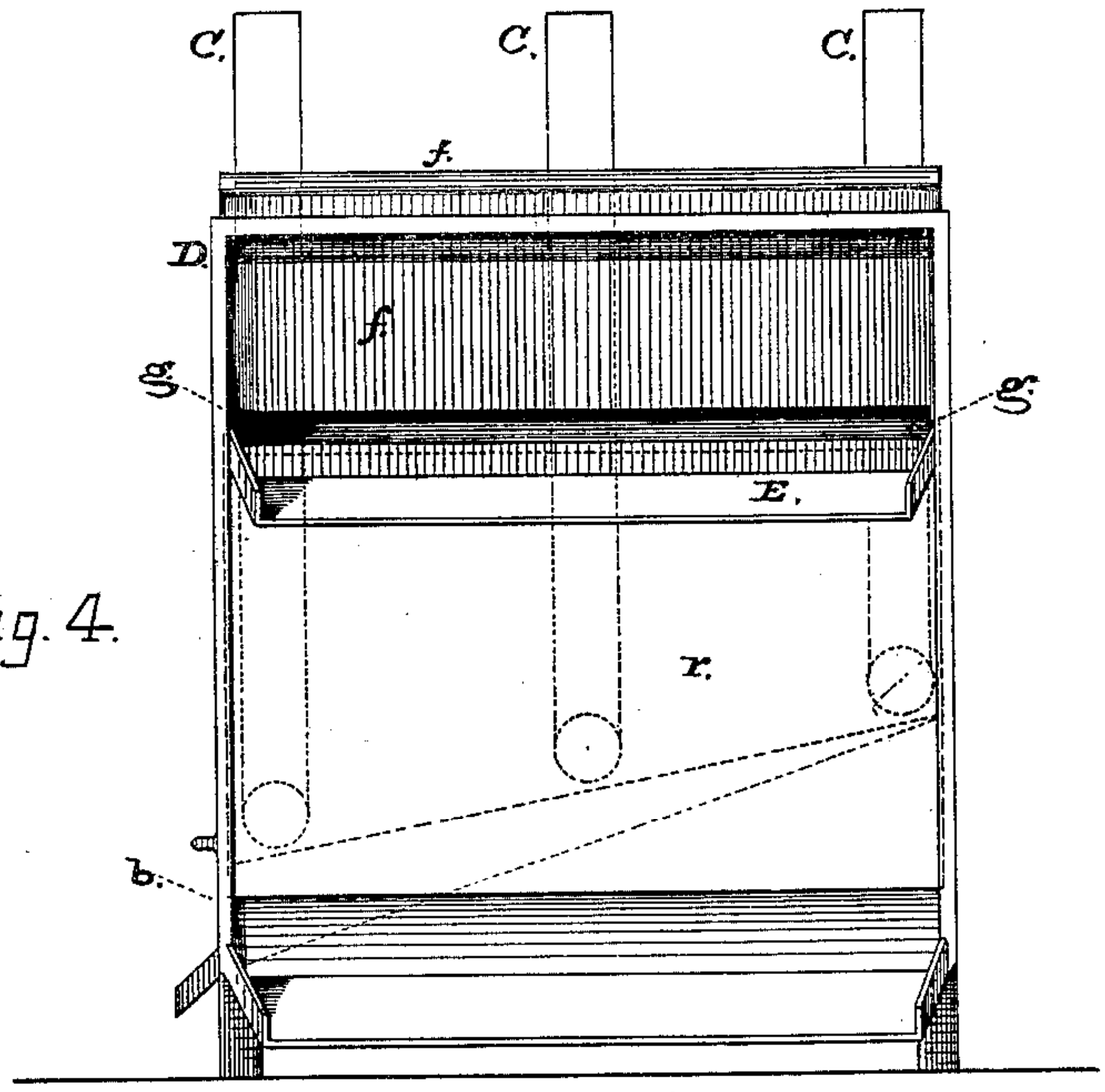
Fig. 4.



Witnesses:
J. L. Boone
Wm. F. Clark.

Inventor:
Lewis M. Kellogg
by his Attys.,
Bonner & Brown

UNITED STATES PATENT OFFICE.

LEVI M. KELLOGG, OF SAN FRANCISCO, CALIFORNIA.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 231,330, dated August 17, 1880.

Application filed March 26, 1880. (No model.)

To all whom it may concern:

Be it known that I, LEVI M. KELLOGG, of the city and county of San Francisco, in the State of California, have invented an Improved Ore-Concentrator; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention has reference to an improved concentrator for separating ore-pulp into two qualities by the specific gravity of the particles. This I accomplish by discharging the pulp into an upwardly-moving current of water, the force of which determines the line of separation between the light and heavy particles.

My machine is so constructed that the ore will be delivered at an angle directly into a stream of water of uniform area and velocity, which moves in an upward direction through a narrow passage, the point of introduction being between the lower end of the passage and the overflow. In my machine the relative distance between this point and the lower and upper end of the passage is adjustable.

The lower end of the passage terminates in a box, into which the heavy particles which resist the current will settle, while the lighter particles are carried upward and out with the overflow. The bottom of the box is so arranged as to collect the heavy particles in one corner of the box, and a gate is provided, through which the particles will discharge automatically.

Referring to the accompanying drawings, Figure 1 is a perspective view taken from the back of the machine. Fig. 2 is an end elevation. Fig. 3 is a vertical section of Fig. 2 in a transverse plane. Fig. 4 is a front elevation.

Let A represent a tight box capable of resisting a strong internal pressure. The bottom of this box is inclined in one direction and pitches to one corner, so that the particles which settle on the bottom will descend by their gravity toward the lowest corner. A vertically-sliding gate, *b*, is arranged over an opening in the side of the box, opposite the lowest corner, through which the particles will pass as fast as they accumulate.

C C C are water-pipes, which connect the rear side of the box with a head or other source of water-pressure sufficient to maintain a pressure of water in the box, as hereinafter described.

Across the front side of the box I construct a narrow flue or passage, D, which extends upward from the box either vertically or at an angle. In the present instance it is represented in a vertical position. The lower end of this passage communicates with the interior of the box, while the upper end is open, and is provided with a side overflow or apron, E, so that when the box is filled with water under pressure the water will flow upward through the passage and out over the apron E.

The height of the overflow is regulated by means of a slide, *r*, which can be moved up or down in front of the passage D, and thus vary the height at which the overflow occurs. Raising this slide has the double effect of increasing the distance which the lighter particles must be lifted before they can escape, and also of diminishing the force of the upward-moving current. Lowering reverses this action. In this manner the adjustment of the force of the water to the weight of the particles can be regulated accurately and independently of the head or source of pressure. This passage D extends entirely across the front of the box, thus forming a wide thin stream, into which I precipitate the ore or pulp.

F is a flat tube, which connects with the rear side of the passage D, between its lower end and the overflow. This tube is as wide as the passage D, and it extends up to the pulp-receptacle at a height greater than the overflow of the passage D. The ore or pulp is fed through this tube into the upward-moving current of water by its gravity. The heavy particles, which resist the upward-moving current, settle downward into the box A, while the lighter particles are borne upward and carried off by the overflow.

This arrangement insures a complete separation of the light and heavy particles, as the ore or pulp is fed into the upward-moving current at such a distance both from its lower end and its overflow that the particles are compelled to

travel a short distance in the current before they escape its influence in either direction, thus insuring a positive separation.

The upward-moving current of water moves in a thin sheet through the upward passage, and the ore or pulp is fed into it in a thin stratum, so that the ore or pulp is thoroughly distributed to the current, and the liability of the pulp to lump is avoided, and also the upward current is made uniform in its flow or force.

The passage-chamber D is enlarged above the point where the pulp is introduced, and in this enlarged portion H the water-passage and the pulp-passage are separated by a vertical plate, *f*, which is arranged to slide up or down in line with the rear side of the water-passage. This allows the water-current to flow upward in front of the plate, while the ore or pulp is introduced into the chamber behind it. The plate has a horizontal opening, *g*, in it, through which the ore or pulp passes over into the water-channel. By raising or lowering this plate, therefore, the point at which the pulp is introduced into the current can be adjusted according to the character of the ore being acted upon.

The outlet or overflow of the water can be adjusted to give greater or less vertical height to the water-column, and the relation of all the openings with reference to each other can be regulated as desired. I also provide a vertically-sliding plate, *h*, in rear of the water-passage, which passes through the top of the box A close to the rear side of the passage. By lowering this sliding plate into the box it forms an extension or lengthening out of the lower end of the water-passage, so that the heavy particles will have farther to travel before they reach the comparatively quiet water in the box. It also serves to give uniformity to the current of water from the box A to the passage D.

This arrangement provides for absolute uniformity both in the flow of pulp and in the upward-moving current, and enables the operator to give to the water an ascending force precisely equal to the weight of any given quality of ore that he may desire, so that all lighter particles will ascend to the overflow and all heavier will fall into the box; and this can be done without any change in the head or quantity of water.

I thus provide a concentrator that will act positively upon the specific gravity of the particles, so as to separate the heavy from the light. It is self-operating and has a large capacity.

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

1. The combination, with the receptacle through which the upward current of water flows, of the vertically-adjustable slide *r* and partitioned tube having an aperture in its partition below the discharging end of the slide, substantially as and for the purpose specified.

2. The combination, with the receptacle through which the upward current of water passes, of the vertical tube with its discharging-port E disposed above the discharging or feeding end of the pulp-tube, as set forth.

3. The combination, with the receptacle through which the upward current of water flows, of the vertical tube provided with the vertical perforated partition *f*, to slide between the feeding end of the pulp-tube and the discharging end or port of the water-tube, substantially as and for the purpose set forth.

4. The combination, with the vertical perforated slide *f*, reaching down into the receptacle through which the upward current of water flows, of the parallel slide *h*, substantially as and for the purpose specified.

In witness whereof I have hereunto set my hand and seal.

L. M. KELLOGG. [L. S.]

Witnesses:
EDWARD E. OSBORN,
WM. F. CLARK.