

(No Model.)

2 Sheets—Sheet 1.

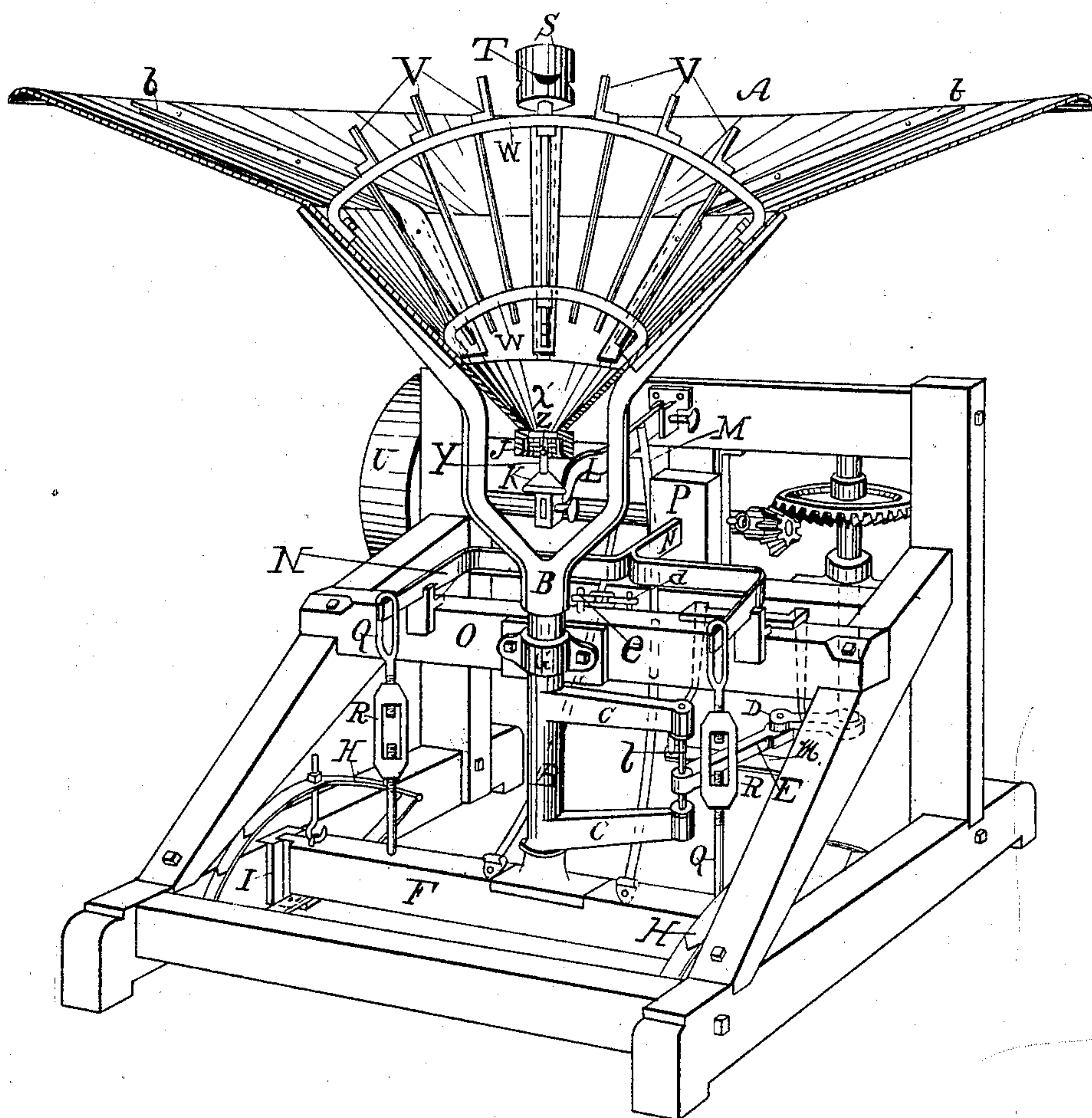
J. H. PEMBERTON.

ORE CONCENTRATOR.

No. 368,683.

Patented Aug. 23, 1887.

Fig 1



Witnesses

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Franklin Thompson.

Inventor

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his Atty.

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Fig 2

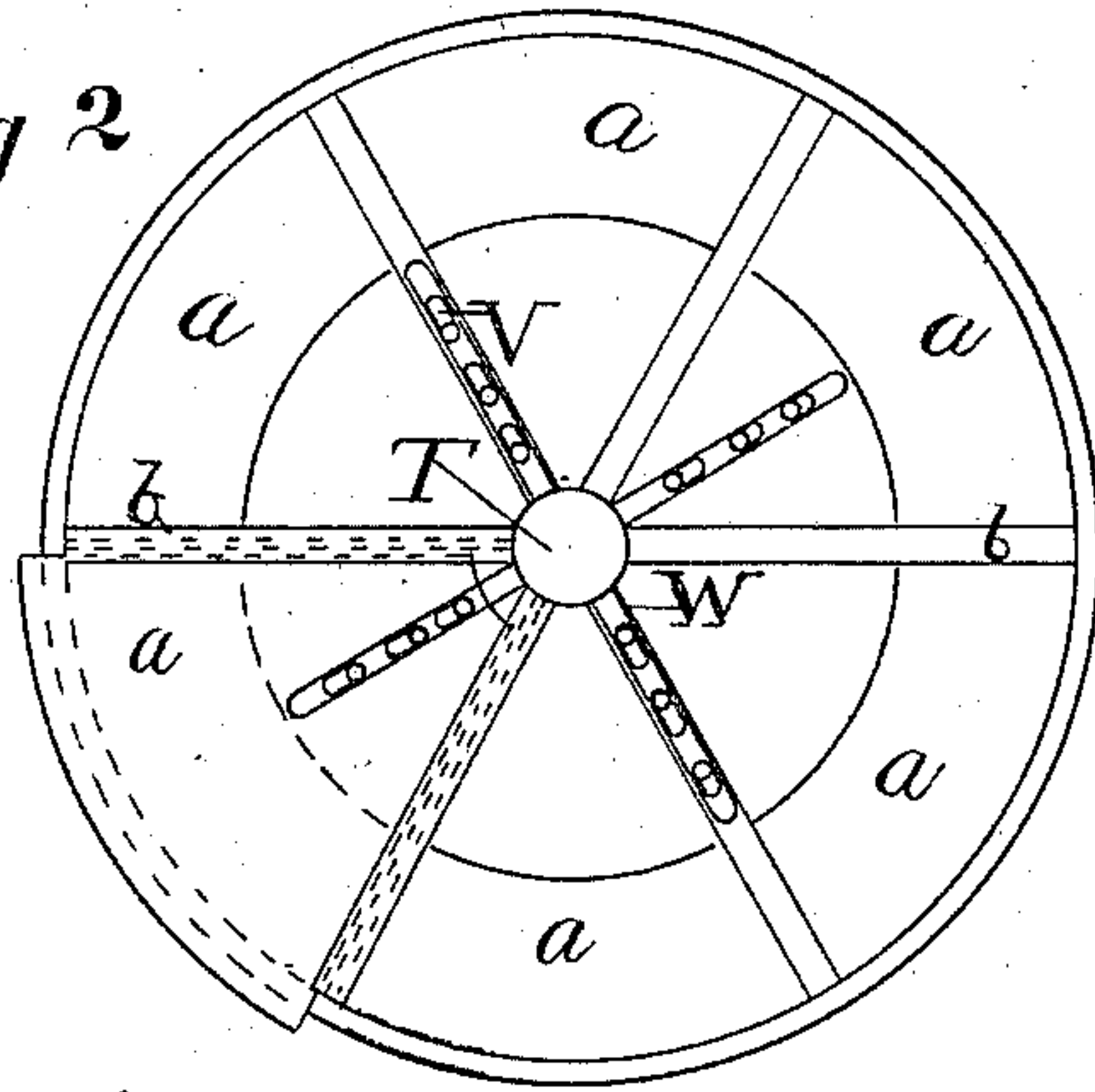
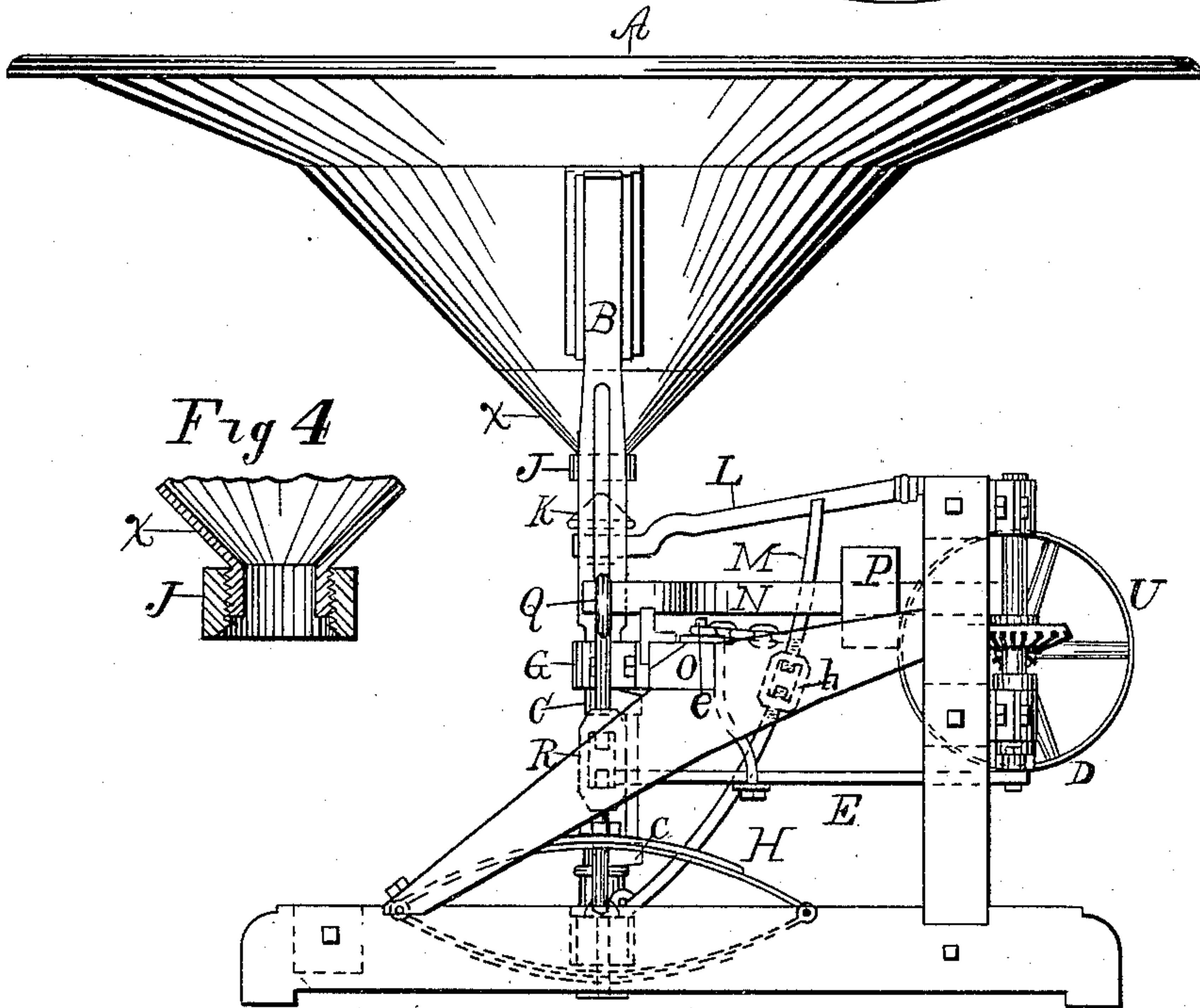


Fig 3



Witnesses

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UNITED STATES PATENT OFFICE.

JOHN H. PEMBERTON, OF LOS ANGELES, CALIFORNIA.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 368,683, dated August 23, 1887.

Application filed January 17, 1887. Serial No. 224,574. (No model.)

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 that class of machines adapted to separate the heavier minerals from the rock and débris with which they are mingled.

The principal object of my invention is to produce a machine which will automatically discharge the concentrate from the machine, thereby avoiding the necessity of constant attention and supervision.

A further object of my invention is to provide simple and efficient means for separating the concentrate from the débris.

I accomplish these objects by means of the machine described herein and illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of my machine, a portion of the hopper being cut away to expose the interior thereof. Fig. 2 is a plan view of the machine illustrating the construction of the hopper. Fig. 3 is a plain side elevation of the machine. Fig. 4 is a vertical sectional view illustrating the discharge-opening of the hopper.

A is the hopper, which is mounted between the arms of the forked shaft B. A crank, C, is mounted on this shaft, and is connected with the crank D by the connecting-rod E. The crank D is connected with the power which runs the machine, and is shorter than the crank C, which is attached to the shaft B, so that the motion of the crank D causes a backward and forward movement of the crank C, thus partially rotating the hopper A, giving sufficient motion thereto to agitate the minerals contained in the hopper, thus allowing the heavier portions to sink to the bottom, while the lighter portions float to the top and flow off around the rim of the hopper.

The shaft B is mounted upon the step-beam F, and is held upright by the bearing G. The step-beam is suspended by means of springs H in vertical guideways I, so that when sufficient weight is placed in the hopper the springs will be pressed down and the step-beam lowered. Spiral springs or springs of any suit-

able construction may be employed to sustain the step-beam.

The crank-pin *l* on the crank C is longer than the bearing on the connecting-rod E, and a stirrup, *m*, is provided to sustain the connecting-rod and hold it in line, so that the shaft may move up and down without interfering with the action of the cranks and connecting-rod.

A nipple, J, is screwed upon the discharge-opening at the bottom of the hopper, so that when it becomes worn it may be removed. A conical valve, K, adapted to close the discharge-opening in the nipple, is mounted upon one end of the arm L, which is pivoted at the other end to the frame of the machine.

A prop, M, is hinged to the step-beam F, and extends upward to support the arm L, which rests thereon, so that the downward movement of the step-beam will cause the valve K to be lowered. It will be observed that the distance through which the valve will be moved by the downward motion of the step-beam will depend largely upon the point at which the prop is attached to the valve-arm L, and that by moving the prop near to the pivot end of the valve-arm the downward movement of the valve will be much greater than the downward movement of the step-beam, so that when the hopper is depressed the valve will be withdrawn from the nipple of the hopper, thus allowing the concentrate to flow out, and when the springs force the hopper upward the prop will elevate the valve and close the nipple of the hopper. In order to secure greater sensitiveness on the part of the machine, and to relieve the spring from the great weight of the hopper filled with slums, I provide a balance-beam, N, which is fulcrumed upon the cross-timber O, and is provided with a weight, P, upon one end, and is connected with the step-beam by the rods Q, provided with turn-buckles R. The weight P is adapted to slide backward and forward upon the balance-beam, so as to regulate the amount of weight in the hopper which will be required to depress the springs.

The operation of the machine is as follows: The slums are allowed to flow from the battery into the can S, and through the two slots T into the hopper, and the weight P is placed at such a point upon the balance-beam that when

the hopper is filled with slums a certain amount of concentrate will be sufficient to overcome the resistance of the springs H and raise the weight P, thus allowing the hopper to sink downward and open the valve and allow the concentrate to escape. The power, now being applied to the band-wheel W, causes the crank D to revolve, thus turning the hopper back and forth. The agitators V serve to disturb the slums and prevent them from packing, thus allowing the heavier minerals to sink into the bottom of the hopper, while the lighter portions of the slums flow off around the rim of the hopper, which is curved over, as shown in the drawings in Fig. 1, to prevent the slums from running down the sides of the hopper. The agitators V are iron rods passing through holes in the curved irons W, and are bent at the top to prevent them from slipping too far down into the hopper. The lower portion of the hopper X is formed of a single piece of metal, which is turned smooth upon the inner side, so that the concentrate will not be agitated or sufficiently disturbed in that portion of the hopper to permit a flow of water through the nipple or discharge-opening, but will gradually settle down and pass out as the accumulation goes on, that portion of the lower part of the hopper being always filled with concentrate, thereby preventing the flow of water through the discharge-opening in the bottom of the hopper. A vertical rod, Y, extends upward from the center of the valve K, and has cross-arms Z projecting therefrom, so as to serve as agitators to prevent the concentrate from packing at the bottom of the hopper, the arms remaining stationary while the hopper and the concentrate therein are turned back and forth.

In order to avoid the expense occasioned by the wear and tear of the slums upon the hopper, I provide copper sheets *a a*, which I slip beneath cleats *b b*, so that the hopper is lined with copper sheets, which receive the attrition of the slums, and which also serve to amalgamate any free gold which may come into contact therewith.

The valve K is removably attached to the valve-arm L, so that when it becomes worn it may be replaced with a new valve at slight expense.

The concentrates from some ores are of nearly the same specific gravity as the slums, and in other ores they are much heavier, so that it is necessary that the discharge of the machine should be controlled by mechanism which can be made more or less sensitive. The springs, together with the balance-beam, serve to secure this sensitiveness and allow it to be regulated, and by changing the position of the prop the sensitiveness of the valve can be accurately regulated.

A chain, *d*, is attached to the prop M and fastened to the cross-beam O by means of the pin *e*, so that the angle of the prop may be changed by hooking different links over the

pin. Turn-buckles *h* are provided to lengthen and shorten the prop, so as to regulate the position of the valve and allow the position of the prop to be changed without changing the elevation of the valve.

The object of the can S is to prevent the downward current which would be created by allowing the slums to flow directly into the hopper, and which would tend to prevent the concentrates settling down firmly enough into the bottom of the hopper to prevent the water from flowing out.

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

1. In an ore-concentrator substantially such as described, the combination, as set forth, of the vertically-movable separating-hopper provided with an opening for the passage of the concentrate, a valve fitting such opening, a lever supporting said valve, a support separate from the hopper sustaining one end of said lever, and mechanism connecting said lever with the hopper.
2. In an ore-concentrator, the combination of the vertically-movable separating-hopper provided with a discharge-opening at the bottom thereof, the valve for closing the discharge-opening, the lever pivoted to a support at one end and having the valve mounted upon the other end, the prop connected with the hopper by suitable means, and connected with the lever at a point between the valve and the pivoted end of the lever, substantially as set forth.
3. The combination of the hopper, the vertically-movable shaft B, step-beam F, prop M, valve-lever L, valve K, and the frame of the machine.
4. In an ore-concentrator substantially such as described, the combination of the separating-hopper, the springs, the balance-beam fulcrumed between its ends, the movable weight mounted upon one end of such beam, and means for connecting the other end of the beam with the hopper, as set forth.
5. In an ore-concentrator substantially such as set forth, the combination of the separating-hopper, the vertical shaft B, the step-beam F, the springs, the rods Q, balance-beam N, support O, and movable weight P.
6. The combination, with a frame, of the funnel-shaped separating-hopper, the shaft B, bearing G, step-beam F, guideways I, springs H, balance-beam N, support-beam O, weight P, rods Q, prop M, pivoted valve-arm L, and valve K, mounted thereon.
7. In an ore-concentrator substantially such as described, the combination of the funnel-shaped hopper and the movable valve K, provided with the upright rod Y and cross-bar Z.

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Witnesses:

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F. M. TOWNSEND.