(No Model.)

C. W. PATTEN.

ORE CONCENTRATOR.

No. 315,824. Patented Apr. 14, 1885.

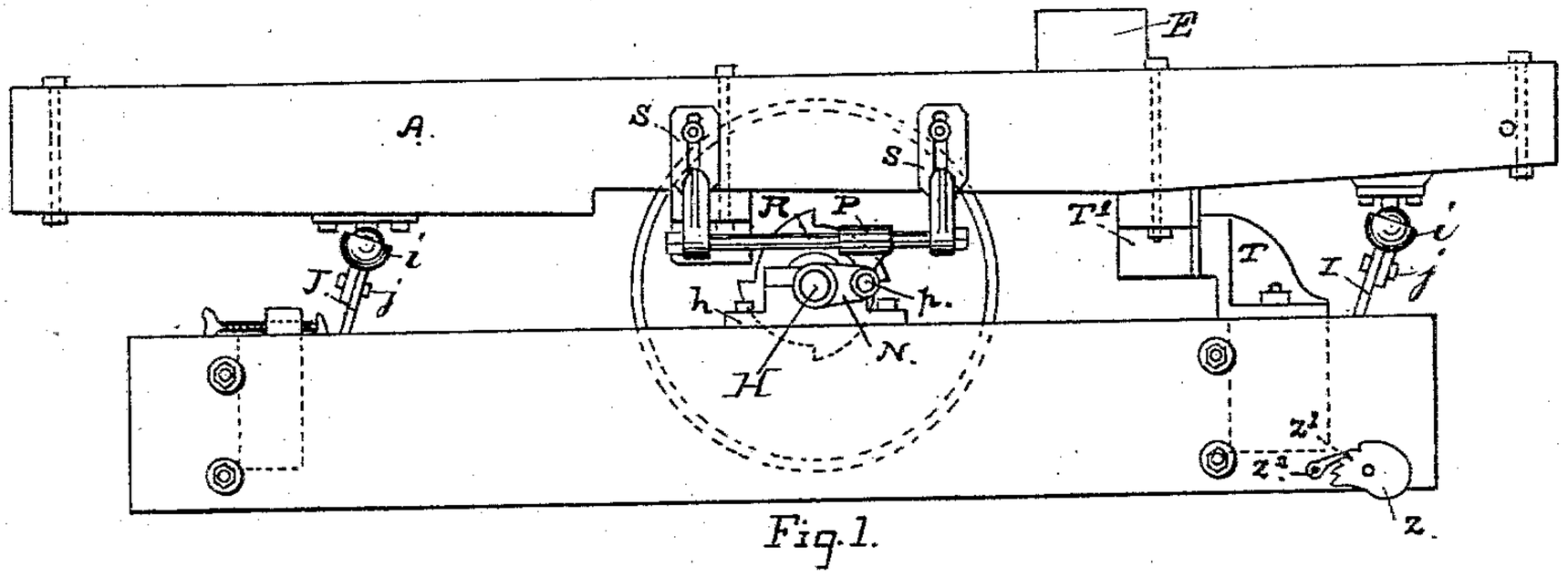
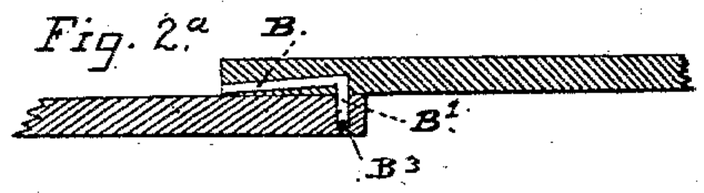


Fig. 1.



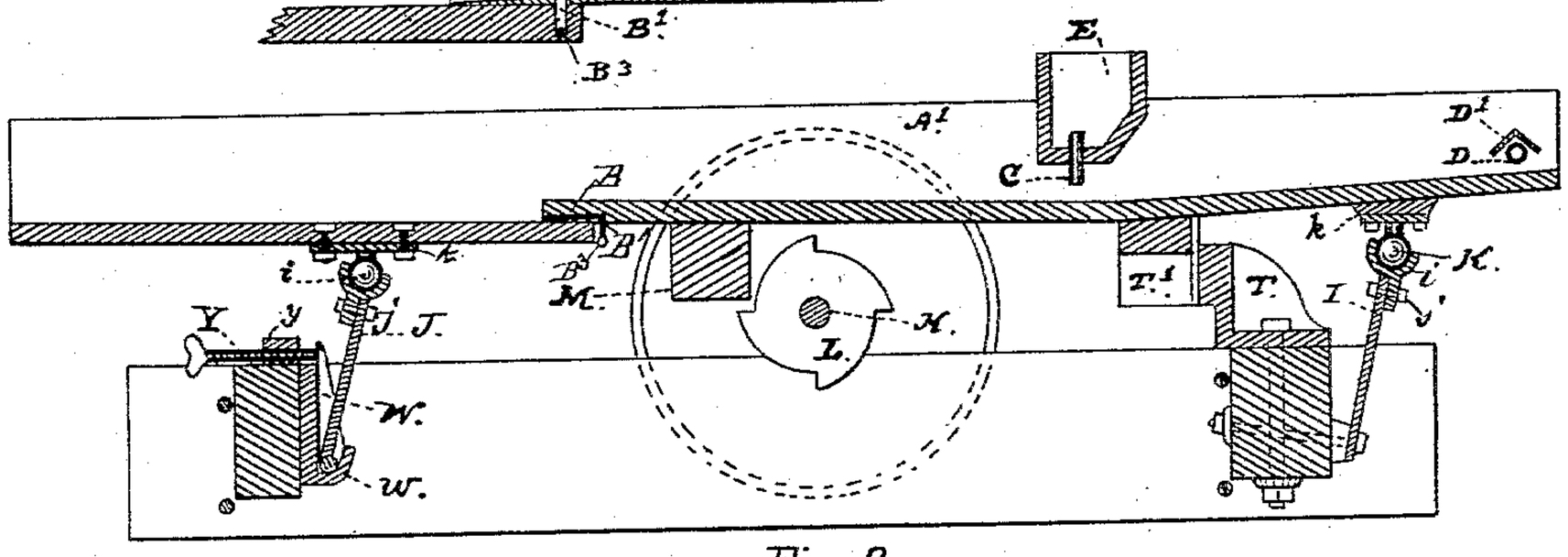


Fig. 2.

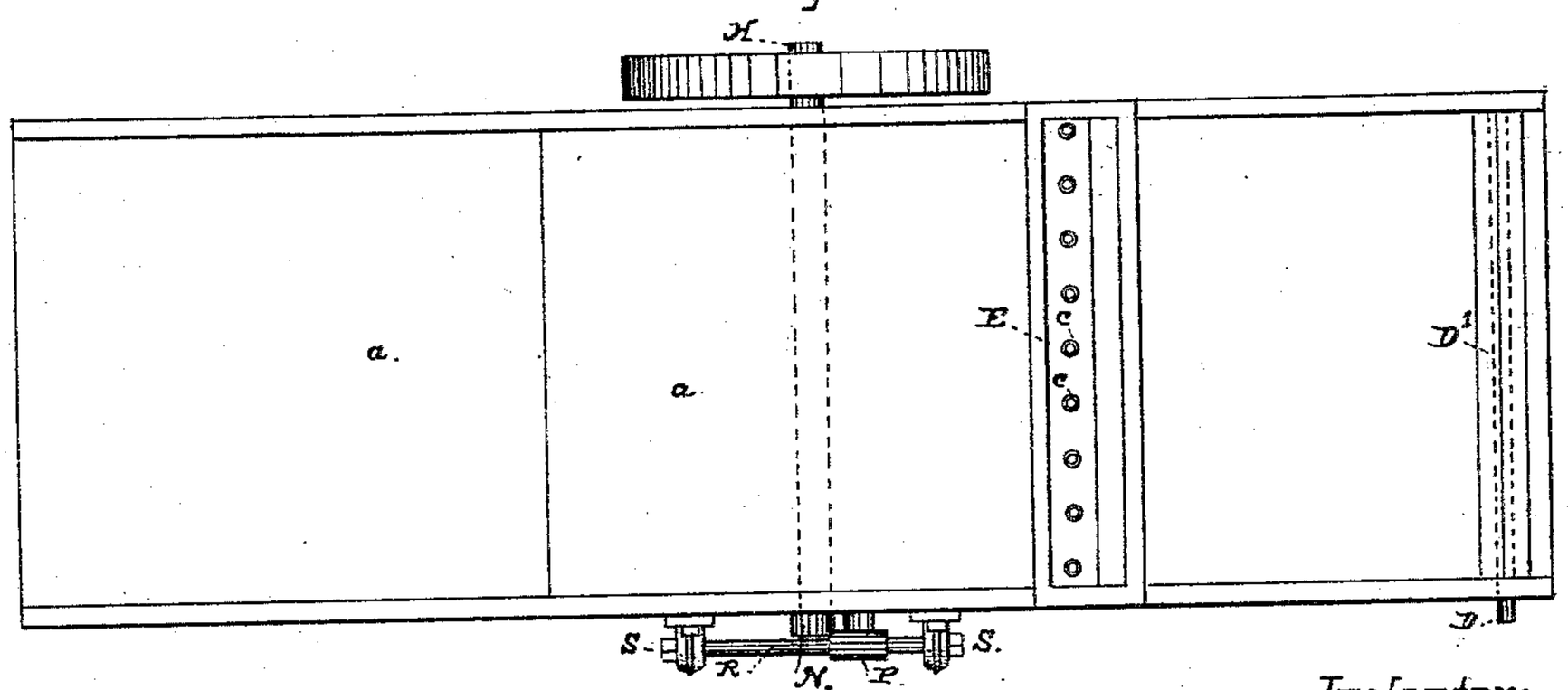


Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES W. PATTEN, OF SAN FRANCISCO, CALIFORNIA.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 315,824, dated April 14, 1885.

Application filed August 17, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. PATTEN, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Ore-Concentrators; and I do hereby declare that the following is a full, clear, and exact description of my invention and of the manner in which I construct and use the same, the accompanying drawings being referred to by figures and letters.

My invention relates to ore-concentrators of that class in which the material in the form of pulp is distributed upon and caused to flow from end to end of a trough, pan, or table having a combination of shaking and rocking motions imparted to it, whereby the sulphurets or particles settling on the bottom are drawn upward against the current of material being treated and discharged from the upper end, while the refuse matter is carried off at the lower end.

As hereinafter more particularly described, my invention embraces certain improvements upon the Letters Patent No. 249,791, granted to me on the 22d day of November, 1881, for an amalgamator and concentrator, and it relates to improved means for mounting and operating a pan or trough having its concentrating-surface formed of stepped sections inclined against the current of material being treated; also to means for mechanically discharging the metallic particles as they collect at the pocket or step formed by the lift or rise of one section of the pan above another.

In the said drawings referred to, Figure 1 is a side elevation of my improved machine. Fig. 2 is a vertical longitudinal section. Fig. 2^a is an enlarged detail section showing the means for the automatic discharge of the sulphurets from the pocket of the pan-sections. Fig. 3 is a top view or plan of Fig. 1.

The surface of the pan or trough A is formed of stepped-sections *a*, having an inclination in the direction in which the mass or current of material flows, or from the head downward to the end where the tailings pass off. I prefer to have the inclination of these sections uniform. I prefer, also, to raise the outer end of the first or highest section, so that its surface inclines in both directions from the ends toward the point where the feed-hopper is placed. This gives an ascending surface in both directions from the distributing-point. This principle of construction is the same as that employed by me in the machine described in my former patent above referred to; but the amount of inclination of the upper or higher end of the first section is considerably reduced in this machine, so that practically no deep depression or V-shaped pocket is produced, as described in my former patent. The perforated discharging-plate and receptacle below to receive the concentrations are also dispensed with in this improved machine, and the concentrations are discharged from the upwardly-inclining end of the head or first section, and also from the bottom of each inclined section, where the end of one section overlaps and rises above the next.

The discharge from the bottom of each inclined surface is effected by means of an internal passage or channel leading through the edge or vertical rise of the next section above it, and then downward with a direct bend to connect with a cross conducting tube or outlet having a discharge at the side of the pan. This channel B has its bottom on a level with the surface of the lower section, and it is carried upward to meet the vertical passage B′ at greater or less inclinations against the travel of the sulphurets passing out. The double thickness of material produced by overlapping the sections permits these passages to be formed in the wood or material of which the inclined surfaces are produced. This discharge-passage B may also be carried through the edge of the uppermost section and out over the inner end of the lower section, as indicated in Fig. 2, and not down through or into the end of said section, as shown in the detail view, Fig. 2^a.

The transverse outlet B^3 should connect or lead into a receiving box or trough at the side of the machine.

A water-supply pipe, D, is fixed across the upper end of the pan, and an angular deflecting-plate, D′, is placed over it to throw the stream of water down upon the surface beneath.

The feed-hopper is a box, E, secured across the top of the pan upon the upper sides, A′.

It is employed to receive the pulp from the battery and distribute it evenly across the surface of the pan.

The distributing-outlets are formed of a number of short upright tubes, *c c*, fixed in and projecting through its bottom. The ends of these tubes are carried up above the level of the hopper-bottom, in order to form along the bottom surface, inside, a pocket or receptacle to retain any amalgam that may be carried over by the stream of pulp from the battery. The amalgam, being considerably heavier than the other particles, will be caught and retained in the space around the tubes, while the pulp will pass off through the tubes and be distributed upon the surface beneath. Much valuable amalgam that would otherwise escape is thus saved.

The horizontal vibration and a transverse rocking motion are produced from a single rotating shaft, H, placed beneath the trough in bearings *h h* on the stationary base or frame.

Two spring-legs, I J, are fixed rigidly by their lower ends to the cross-timbers of the frame, and are provided with open cup-shaped sockets *i i* on their upper ends. These sockets are formed of cups *i i*, secured to the legs by bolts *j*. Fixed bearing-points *k*, having ball-shaped ends K to fit the sockets *i*, are bolted to the bottom of the pan—one at the upper end or head, and the other near the lower end—the two being in line in the middle of the pan. These points of support permit universal motion of the trough longitudinally and laterally. The longitudinal motion is permitted by virtue of the elasticity of the legs I J, that are fixed at their lower ends to the frame and carry the pan upon their free ends. The longitudinal motion is produced by the action of a cam, L, on the shaft H and a stop, M, fixed on the bottom of the pan. The lateral rocking motion is produced through the medium of a crank, N, fixed to the outer end of the shaft H, and connected by a swivel or pivot, *p*, to a slide, P, carried by a horizontal guide-rod, R, on the side of the trough. The lateral motion is a regular rocking motion upon centers that are at the upper ends of the two spring-legs. This motion is equal and uniform for the whole length of the pan.

The guide-rod is held in brackets S S, bolted to the side of the trough, and its length is proportioned to the stroke of the crank N.

The brackets are slotted to permit vertical adjustment of the rod.

The sleeve or slide P connects the crank and guide-rod together, and, while free to slide from one extreme to the other of the throw, it converts the continuous rotation of the crank-shaft into a rocking motion of the pan on the center K K.

In connection with the longitudinal vibration a slight blow, jar, or concussion is given to the trough at the end of each forward movement by securing a bumper, T, upon the cross-timbers of the frame and fitting a block, T′, to the bottom of the trough in line with the fixed bumper T on the frame. The intensity of the concussion is increased by setting forward or changing the inclination of the spring-legs I J. For this purpose an open socket, *w*, is fixed on the inner face of the cross-timber of the stationary frame, and the lower end of the spring J is fixed to a tappet or finger, W, having a straight back edge to set against the socket-plate and of sufficient length to bear at its upper end against a horizontal set-screw, Y, provided in a box, *y*, in the cross-timber. This finger and the end of the spring-leg are rigidly fixed together, and while the end of the spring rests in the socket the finger W lies outside of the bowl or hook-shaped part.

By setting up the screw Y the finger will be pressed back from the plate, and the spring will be thrown forward at the upper end in corresponding manner. The resistance of the stop to the blow of the cam is thereby increased, and the force of the concussion is changed accordingly.

A leveling device is fixed to one end of the stationary frame or base of the machine for the purpose of adjusting the inclination of the concentrating-surface to a greater or less degree of pitch. This device is formed of two cams, *z*, one pivoted to each side of the side timbers of the frame at the head or upper end, and held in position by means of ratchet-teeth *z′* on the blocks and pawls z^2 on the frame. This construction is clearly shown in Fig. 1 of the drawings.

By turning the cams *z* one way or the other the device will be lowered or raised at that end, and for this purpose, in practice, the cams will rest upon a support—such as a floor or sill.

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

1. The combination of a concentrating-pan, spring legs or supports placed under the center thereof, and connected thereto at the upper ends by ball-and-socket joints that permit of universal motion of the pan upon them, and having their lower ends rigidly fixed, and mechanism combined with said pan for imparting to it longitudinal vibration and a transverse rocking motion upon said spring-supports, substantially as herein set forth.

2. The combination, with a concentrating-pan and spring-supports placed under the center thereof, and provided with universal joints and held rigidly at their lower ends, of the transverse shaft H, the cam, and the stop on the pan, substantially as described.

3. The combination, with a concentrating-pan and spring-supports placed under the center of said pan, and having universal-joint connections therewith, of the shaft H, the crank, the slide, the guide-rod, the cam, and the stop, substantially as and for the purpose set forth.

4. A concentrating-pan formed of stepped sections, the head or first section being inclined in two opposite directions longitudi-

nally, spring-supports I J, and mechanism for imparting to said pan a longitudinal vibration and a transverse rocking motion, all combined substantially as herein described.

5. A concentrating-pan formed of stepped sections and having a discharge passage or channel, B, leading out from the pocket or gutter, formed by the rise of one section above the other, in an upwardly-inclined direction, as shown and set forth.

6. A concentrating-pan formed of stepped sections having a discharge passage or channel, B, leading out from the pocket or gutter, formed by the rise of one section above another, in an upwardly-inclined position for a short distance, a vertical channel, B′, leading down from the upper end of channel B, and an outlet-channel, B^3, as set forth.

7. The combination, with the cam, stop, pan, and spring-support, of means for regulating the resistance of the spring-support to the cam, consisting of the open socket *w*, tappet W, and set-screw Y, substantially as described.

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