(No Model.)

J. W. BAILEY.

AMALGAMATOR AND SEPARATOR.

No. 531,296. Patented Dec. 25, 1894.

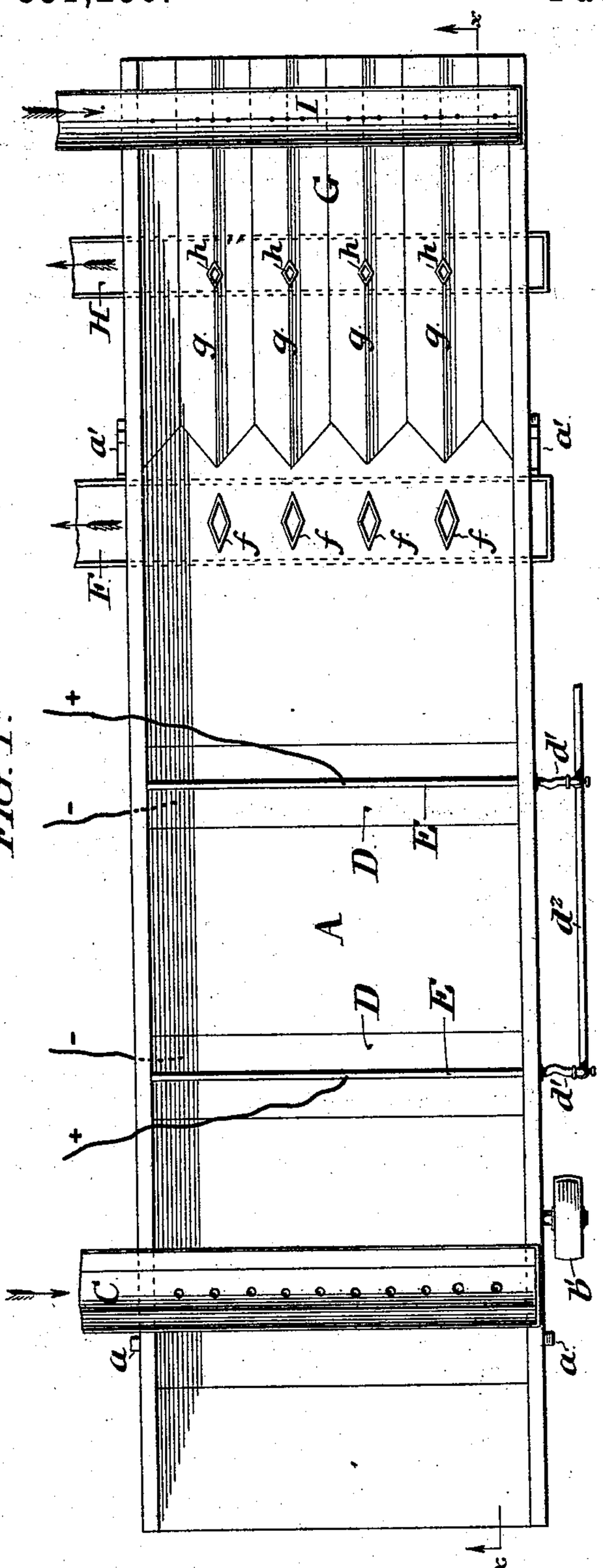

FIG. 1.

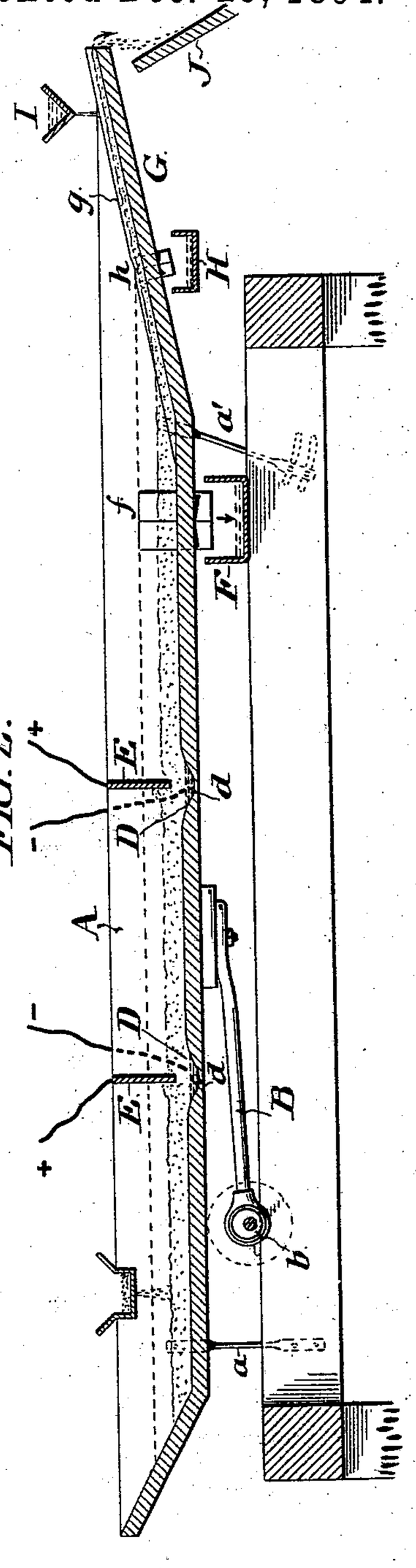

FIG. 2.

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AMALGAMATOR AND SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 531,296, dated December 25, 1894.

Application filed March 1, 1894. Serial No. 501,937. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. BAILEY, of Denver, in the county of Arapahoe and State of Colorado, have invented a certain new and useful Amalgamator and Separator, whereof the following is a specification, reference being had to the accompanying drawings.

The object of my invention is to combine in one device an amalgamator for extracting gold and other precious metals from pulverized ore, with a vibrating separator by which the heavy and valuable concentrates are removed and separated from the lighter gravel and sand with which they are associated. In addition to this, both the amalgamator and separator are themselves of novel construction.

In the accompanying drawings, Figure 1 is a plan view of my device. Fig. 2 is a vertical longitudinal section of same through *x*—*x*, Fig. 1.

A is a shallow flat bottom frame of any suitable construction. It is mounted upon flexible metal bars, *a*, *a'*, which allow it to receive a rapid longitudinal vibratory motion. The bar, *a*, and its fellow, not seen, are upright. The bars, *a'*, near the discharge end, are thrown forward at an angle whereby each forward motion of the frame results in a slight depression of this end. Beneath the frame is fastened a connecting rod, B, the extremity of which is eccentrically attached to the shaft, *b*, driven by the wheel, *b'*. This imparts to the frame a very rapid vibratory motion.

C is a feed box, containing small holes in its bottom whereby the stock is evenly distributed across the entire width of the vibrating frame.

D, D, are shallow troughs running transversely across the bottom of the frame. These troughs have gradually sloping sides and are filled with mercury, *d*. Directly over each of these mercury troughs is a transverse metal bar, E, insulated therefrom. This bar is connected with the positive pole of a source of electricity and the mercury with the corresponding negative pole. At the side of each of these mercury troughs is a flexible exit pipe, *d'*, preferably of rubber, and connected with a pipe, d^2, whereby the mercury may be drawn off and returned while the frame is in motion.

f, *f*, *f*, are a series of pipes extending through the bottom of the frame and reaching upward to the height of the water level. These pipes are elongated longitudinally and have a pointed edge in the direction from which the stock advances. Beneath the series is a transverse sluice box, F, into which they all empty. The discharge end of the frame is made with a very gradually inclined plane, G, with a series of longitudinal corrugations, *g*, *g*. Through the crest of each of the corrugations, at the point where they emerge from the water level, is a second series of openings, *h*, *h*, *h*, and beneath the series of openings, a second transverse sluice box, H, into which they all empty.

I is a transverse drip box extending across the discharge end above the water level. It is fitted with minute perforations in its bottom and connected with a suitable supply of water, along with means for regulating the supply.

J is the edge of a large receptacle into which the frame discharges its contents.

The operation of the device is as follows: The stock is continuously fed along with water into the frame from the feed box, C, and by the rapid vibratory motion of the frame is sorted, the metals and heavy concentrates going to the bottom, while the sand and earthy matters rise to the top. The slight dip imparted to the discharge end, by reason of the inclined position of the bar, *a'*, causes a constant steady advance of the material toward the discharge end. As the stock passes the transverse mercury troughs the amalgamating process absorbs the free metals in the usual way. The electrical connections constitute the masses of mercury cathodes and the corresponding metal bars anodes, and the resultant electrical action tends to keep the surface of the mercury bright and clean, largely increasing the absorbing power. The rapid vibration of the frame and consequently of the mercury troughs further occasions a constant rolling of the mass of mercury and assists in maintaining a clean surface, while at the same time the sloping sides of the troughs prevent the agitation of the mercury from being so violent as to cause disintegration or flowering. The tubes, *d'*, *d'*, with their flexible connections, make it possible to withdraw the mercury when fully charged with

the removed metals and to substitute new mercury without stopping the motion of the machine or interfering with the continuity of the process. The metals being removed, the stock passes on with the waste material at the top. Upon reaching the first set of discharge pipes, *f*, *f*, the mass divides and passes around them. In order to prevent this division of the mass from disturbing the stratification the edges of the pipes presented toward the advancing mass are made wedge shaped terminating in a point, and the whole pipe is longitudinally elongated so that it may obstruct the progress of the material as little as possible. The height of these pipes regulates the height of the water in the frame, and as the water is drawn off at the surface through the pipe it carries with it the light material which gradually piles up at this point near the surface. The heavier material is forced on along the bottom and up the edges of the inclined plane, G, seeking of course the valleys of the corrugations, and eventually over the edge into the receptacle, J. As it emerges above the water level it invariably carries with it clinging to the surface some light material which has failed to pass off through the pipes, *f*, *f*. This is washed back by the flow from the drip box and carried out through the openings, *h*, *h*, in the crests of the corrugations at the water level.

My device therefore results in effecting in one operation, and with one apparatus, the removal of the metal by the process of amalgamation, and the concentration of the heavy sulphides and their separation and removal from the waste gangue.

Having thus described my invention, I claim—

1. An amalgamator consisting of a frame with means for imparting thereto continuous, rapid, longitudinal vibration, and transverse troughs filled with mercury in the bottom of the frame, said troughs having sloping sides and being so constructed as to oppose only inclined surfaces to the rolling motion of the mercury, substantially as described.

2. An amalgamator consisting of a frame with means for imparting thereto continuous, rapid, longitudinal vibration; transverse troughs filled with mercury in the bottom of said frame; corresponding transverse metal bars situated above each of the mercury troughs, and electrical connections whereby each mass of mercury is constituted a cathode and each metal bar an anode, substantially as described.

3. An amalgamator consisting of a frame with means for imparting thereto continuous, rapid, longitudinal vibration; transverse troughs filled with mercury in the bottom of said frame; corresponding transverse metal bars situated above each of the mercury troughs; electrical connections whereby each mass of mercury is constituted a cathode and each metal bar an anode; and a series of pipes standing up through the bottom of the frame to the level of the water in the frame, substantially as described.

4. A concentrator consisting of a frame with means for imparting thereto continuous, rapid, longitudinal vibration; a gently inclined discharge end having longitudinal corrugations; and a series of openings at the points where the crests of the corrugations cross the water level, substantially as described.

5. A concentrator consisting of a frame with means for imparting thereto continuous, rapid, longitudinal, vibration; a gently inclined discharge end having longitudinal corrugations; a series of openings at the points where the crests of the corrugations cross the water level; and a drip box above the series of openings, substantially as described.

6. A concentrator consisting of a frame with means for imparting thereto continuous, rapid, longitudinal vibration; a series of pipes standing up through the bottom of the frame to the level of the water in the frame; a gently inclined discharge end having longitudinal corrugations; and a series of openings at the points where the crests of the corrugations cross the water level, substantially as described.

7. A concentrator consisting of a frame with means for imparting thereto continuous, rapid, longitudinal vibration; a series of pipes standing up through the bottom of the frame to the level of the water in the frame; a gently inclined discharge end having longitudinal corrugations; a series of openings at the points where the crests of the corrugations cross the water level; and a drip box above this series of openings whereby the light material is removed, substantially as described.

8. A combined amalgamator and concentrator consisting of a suitable frame having one or more sloping edges; suitable receptacles filled with mercury in the bottom of the frame; metal bars above each of said mercury receptacles; electrical connections whereby each mass of mercury is constituted a cathode and each metal bar an anode; and means for imparting to said frame continuous vibratory motion which imparts a rolling motion to the mercury during the process of amalgamation, and which at the same time effects the concentration of the stock by driving the tailings over the sloping edges of the frame, substantially as described.

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Witnesses:
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