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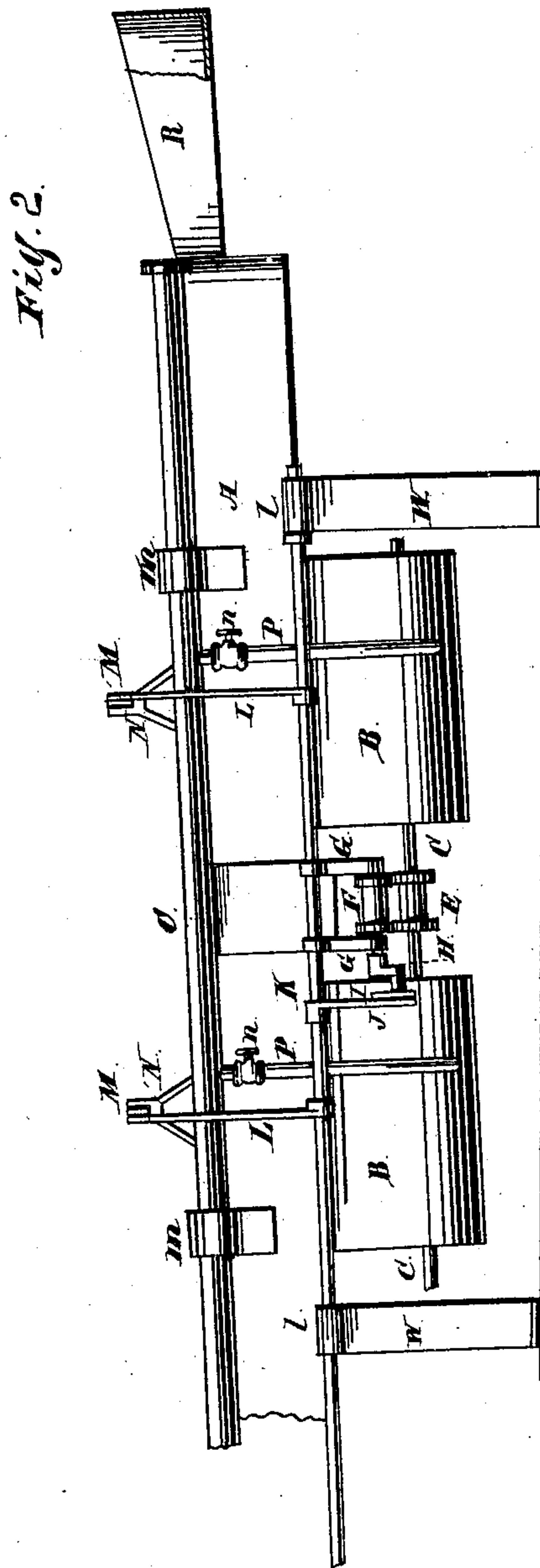
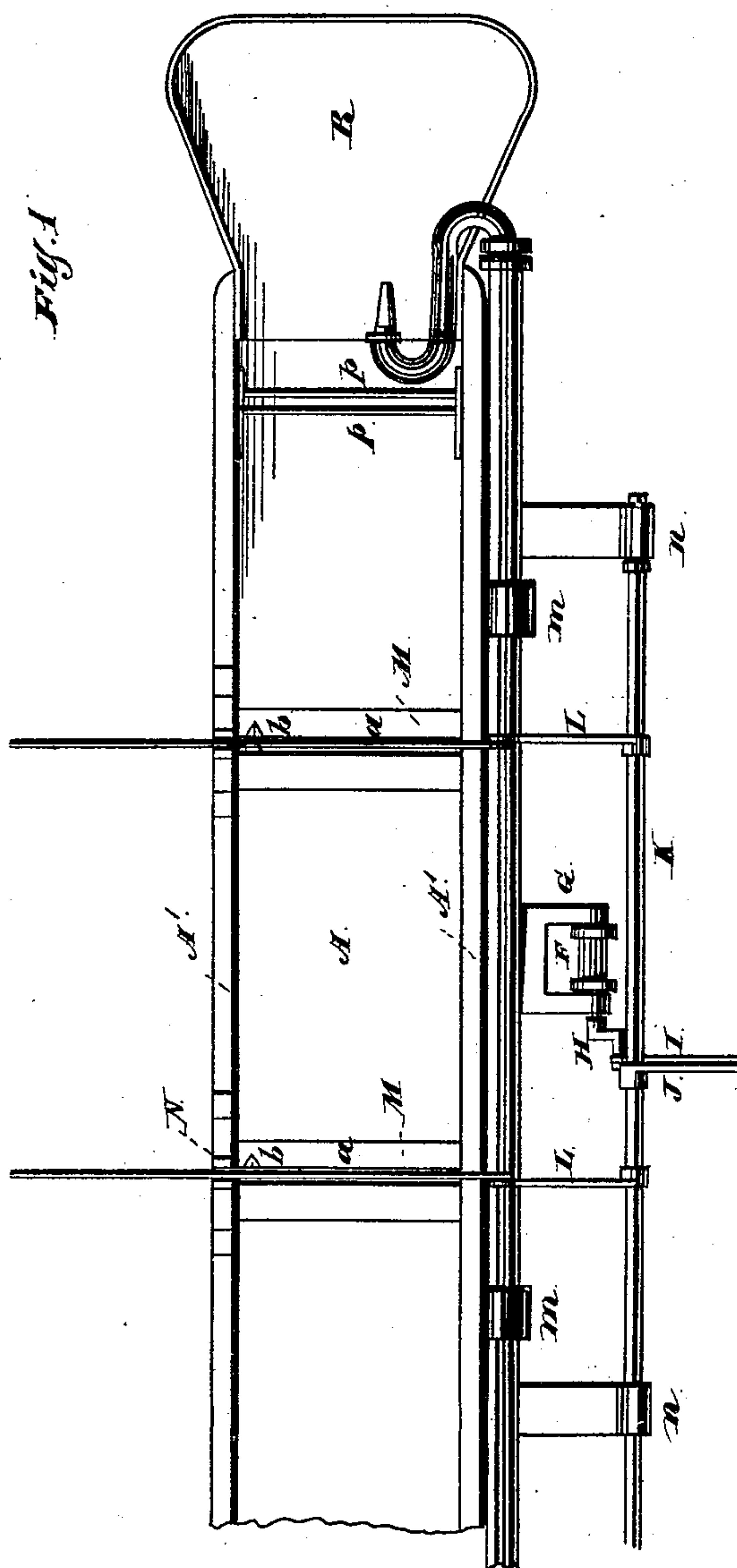
2 Sheets—Sheet 1.

M. BENNER.

MACHINE FOR WASHING GOLD.

No. 247,005.

Patented Sept. 13, 1881.



Witnesses:
O. Bond -
A. H. Adams.

Inventor:

Mathias Benner

(No Model.)

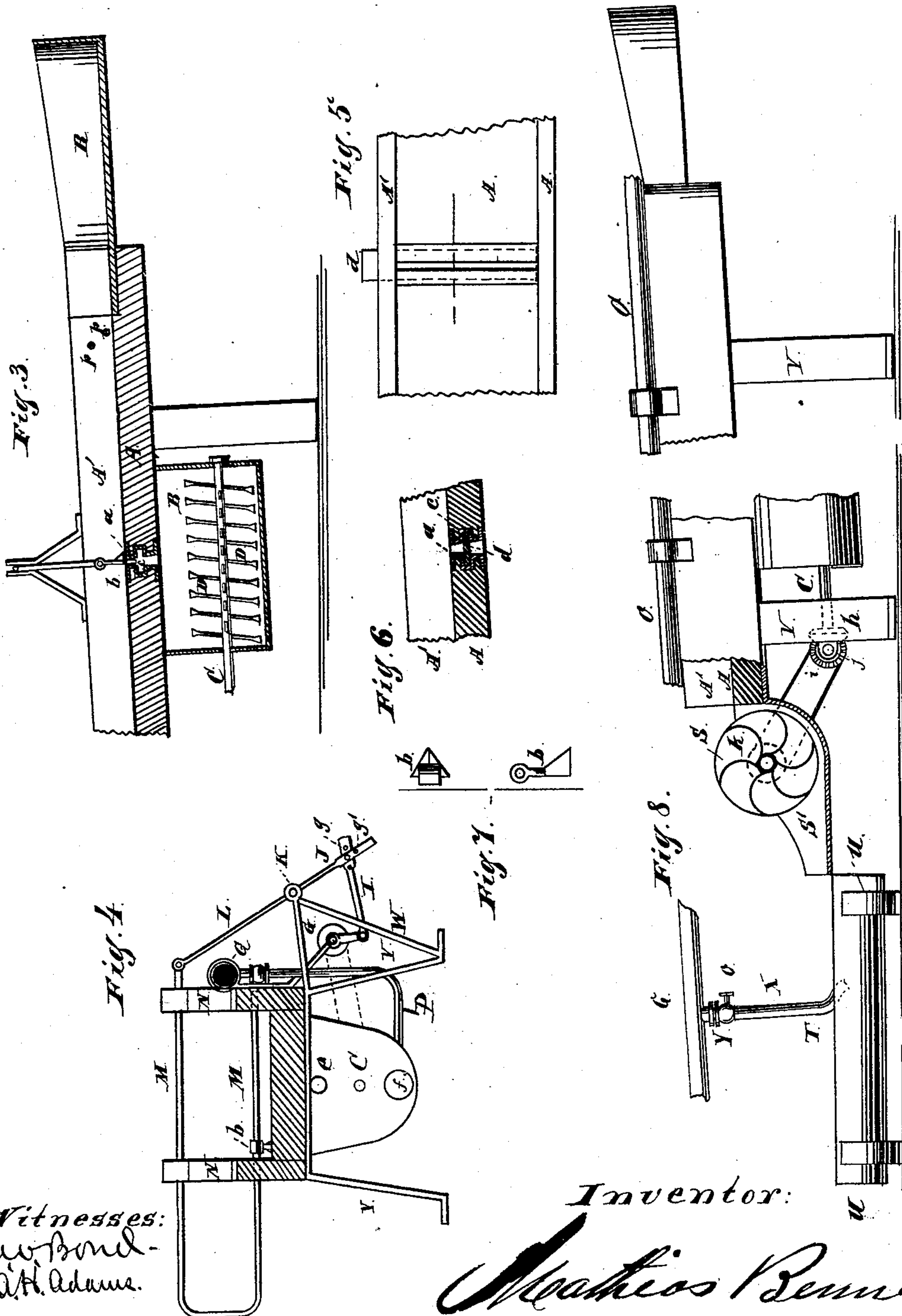
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UNITED STATES PATENT OFFICE.

MATHIAS BENNER, OF CHICAGO, ILLINOIS.

MACHINE FOR WASHING GOLD.

SPECIFICATION forming part of Letters Patent No. 247,005, dated September 13, 1881.

Application filed May 4, 1881. (No model.)

To all whom it may concern:

Be it known that I, MATHIAS BENNER, residing at Chicago, in the county of Cook, and State of Illinois, and a citizen of the United States, have invented a new and useful Improvement in Machines for Washing Gold and other Substances, of which the following is a full description, reference being had to the accompanying drawings, in which—

10 Figure 1 is a top or plan view, showing the receptacle for the material, two sections, and a portion of another section of the sluice-box or trough; Fig. 2, a side elevation of the parts shown in Fig. 1, showing, also, the semi-cylindrical sections or receptacles beneath the sluice-box or trough sections; Fig. 3, a longitudinal vertical section through the receptacle for the material, and one section of the sluice-box or trough and its semi-cylindrical section or receptacle; Fig. 4, a transverse section through the sluice box or trough; Fig. 5, a detail, being a top or plan view of a portion of the sluice-box or trough, showing the transverse slot in the bottom for the passage of the material to be caught and saved into the semi-cylindrical section or receptacle; Fig. 6, a detail, in section, showing the transverse slot and the cut-off or gate for stopping the flow; Fig. 7, a detail, showing a side elevation and top view of the slide or clearer for keeping the transverse slots free and unobstructed; Fig. 8, a side elevation of the head and tail of the sluice-box or trough, with the center broken out, showing the receptacle for the material, the water-wheel for driving the operating mechanism, and the receptacles or troughs at the discharge end of the sluice box or trough.

This invention relates to that class of separators in which the separation is effected by the disintegrating action of a current of water, and is more especially designed for use in separating gold from the dirt, &c., with which it is mixed or to which it adheres, and has for its object to insure and effect a thorough, efficient, and effectual separation. This object I accomplish by the construction of apparatus which I will now proceed to describe in detail, and afterward point out the improvements in the claims.

50 In the drawings, A A' represent the bottom and sides of the sluice-box or trough; B, the

semi-cylindrical sections or receptacles; C, the main shaft; D, the beaters or agitators; E F, the driving-pulleys on the main shaft and crank-shaft; G, the hangers supporting the crank-shaft; H, the crank-shaft; I J, the links or arms for operating the rock-shaft; K, the rock-shaft; L, the arm or lever for operating the support for the slides or cleaners; M, the support for the slides or cleaners; N, the standards or posts for the support M; O, the water-supply pipe; P, the water-supply pipes leading to the sections or receptacles B; Q, the hose or nozzle; R, the receptacle for the material; S, the water-wheel; T, the troughs or receptacles at the tail of the sluice; U, the legs or supports for the troughs or receptacles at the tail of the sluice-box; V, the legs or supports for the sluice-box; W, the supports for the rock-shaft; X, the water-supply hose or pipe leading to the receptacles T; Y, the coupling for attaching the hose or pipe X; a, the slots in the bottom A; b, the slides or cleaners; c, the grooves in the side faces of a; d, the gates or shut-offs for a; e, the overflow for B; f, the hand-hole for withdrawing the contents of B; g g', the adjusting-holes for the links or arms; h i, the miter or gear wheels for driving the shaft C; j, the bearings or supports for the shaft of the wheel i; k, the driving-pulley on the shaft of the water-wheel S; l, the bearings for the rock-shaft K; m, the supports for the pipe O; n, the stem of the valves or cocks for the pipes P; o, the stem of the valve or cock for the coupling Y; p, the detaining-bars for preventing the rocks and other heavy substances from passage down the sluice-box or trough.

The sluice-box or trough consists of a bottom, A, and side pieces, A', and may be made of wood or other suitable material, and when in position may be given a downward inclination, to cause the water to flow freely and carry with it the material to be acted on and separated. Its dimensions as to width and depth should be of sufficient size for the passage of the water and material without liability of its becoming clogged by the material so as to interfere with, interrupt, or impede the passage from end to end, and its length should be such as to insure the separation of all, or nearly all, of the heavier or valuable and desirable portion from the lighter or valueless and undesirable by the

action of the water during the transit from the head to the tail.

At intervals in the bottom A openings or slots *a* are provided, extending through the bottom, which openings are of sufficient width to allow the heavier, or that portion which it is desired to save, to enter and pass through readily, and be deposited in the semi-cylindrical sections B, a single opening or slot being provided for each section, as shown; but more may be provided if one slot does not furnish the required capacity to pass the portion to be caught and saved as fast, or nearly so, as it is separated by the water and descends by its own weight.

The semi-cylindrical sections or receptacles B may be made of sheet-iron or other suitable material, bent as shown, or otherwise formed. As shown, they are a little more than a semi-cylinder, and that portion of the sides above the center is formed straight, or nearly so. As many of these sections or receptacles are to be used as may be required for the length of sluice-box or trough in connection with their own length, and they are secured to the under side of such sluice-box or trough by means of bolts or otherwise, so as to be held in a firm or secure manner. They are located at a little distance apart, and arranged as shown, so that each one will center with a slot or opening *a*, the form of construction and arrangement shown only having a single slot or opening to communicate with each section or receptacle. Each end of each section or receptacle, near the upper edge, is provided with an opening, *e*, which forms an overflow or waste for the discharge of the water and the light material as it is separated from the heavy in the section or receptacle; and, as shown, each receptacle at the end and in line with the inner face of the bottom is provided with an opening or hand-hole, *f*, through which the heavy or valuable material can be withdrawn, the opening or hand-hole being provided with a suitable cover or door to prevent the escape of the material except as desired.

Instead of the opening or hand-hole *f* being located on the end, it might be located on the bottom. It will be evident, however, that instead of using hand-holes for removing the contents of the semi-cylindrical receptacles, stop-cocks might be substituted therefor for accomplishing the same purpose. Each side of each slot *a* is provided with a longitudinal groove to receive a plate, *d*, which forms a gate or shut-off, by means of which the inflow into the receptacle can be stopped, the gate being slid out or in to open or close the slot by hand, one end thereof projecting beyond the edge or face of the bottom A, on the side, for this purpose.

The shaft C passes through all of the sections or receptacles at the center of the circle, and on this, in each receptacle, is located a stirrer or beater, D, formed of paddles or arms extending out from the shaft. The shaft C is sup-

ported in suitable bearings, and stuffing-boxes may be provided to close the opening where it passes through each receptacle. This shaft is given a rotary movement in any suitable manner, causing the stirrers or beaters to revolve and act on the contents of their respective receptacles and agitate the water and disintegrate the material, causing the light to rise to the top and pass off through the waste-openings *e*, and allowing the heavy to sink to the bottom by its own gravity.

On the shaft C, in the space between any two of the receptacles B, is located a pulley, E, one or more, according to the length of the sluice-box or trough. This pulley or these pulleys are arranged in line with a pulley or pulleys, F, located on a crank-shaft mounted in a bracket or support, G, attached to the sluice-box or trough, and over these pulleys E F a belt passes to impart a rotary movement to the pulley F from the pulley E. Instead of pulleys and belt, sprocket-wheels and chain may be used.

One end of the shaft on which the pulley F is secured is provided with a crank, H, to the end of which is pivoted one end of a bar or link, I, the other end of which is pivoted to the outer end of an arm or link, J, the other end of which arm or link is secured to a shaft, K, mounted in suitable bearings, *l*, on the upper end of standards or supports W, which supports extend up, as shown, from the legs or supports V, on which the sluice-box or trough is supported, suitable braces being provided to give the necessary rigidity to the standards or supports W. The shaft K is nearly the entire length of the sluice box or trough, and is given a rocking movement by the rotation of the crank H, the extent of the movement being adjusted by the holes *g g'* in the outer ends of the arms or links I J.

On the rock-shaft K, in line with the slots or openings *a*, are secured arms L, one to correspond with each opening; and to the upper end of each arm is secured one arm of a sliding bar, M, which bar is supported in standards N, one on each side of the sluice-box or trough, so as to be free to slide back and forth. The other arm of this sliding bar M has secured thereto a slide or clearer, *b*, formed as shown in Fig. 7, or in some other suitable form adapted to enter the slot *a* and play back and forth therein as the bar M is reciprocated, and keep the slots clear and open for the inflow or passage of the heavy material into the sections or receptacles. As shown, these slides or clearers are formed with a shank to pass through the slot and act to keep it open and clear, and a broad base, which acts as a stop by engaging the under face of the bottom *a* and prevent the slide or clearer from being caught and thrown out accidentally.

The water-supply pipe O, as shown, is located on the side and upper edge of the sluice-box or trough, and is supported by means of brackets or supports *m*, attached to the sluice-box or

trough; but it may be otherwise located and arranged, so long as it is adapted to convey water under pressure, to be discharged by a pipe or nozzle, Q, or otherwise, to wash the material from the receptacle R down the sluice-box or trough.

The branch pipes P enter supply-pipe O and lead therefrom to the receptacles or sections B, a pipe being provided for each receptacle or section. These pipes are for the purpose of flushing or washing the receptacles after the caught material has been removed, so far as practiced by hand, and insuring the removal of any material that may catch or stick on the sides of the receptacle, by such flushing or washing, receptacles being provided into which the water and material will be deposited as the water runs out through the openings *f*. The water-supply to these pipes P is cut off or let on by a suitable plug or valve (not shown) operated by a stem, *n*—one for each pipe P.

The receptacle R is located at the head end of the sluice-box or trough, and into it is dumped or deposited the material to be separated, the capacity of the receptacle corresponding to the working capacity of the sluice-box or trough. This receptacle may be of the form shown or any other suitable form for dumping or depositing the material therein, and may be made of wood or other suitable material.

As shown, the power for driving the shaft C is derived from a water-wheel, S, located at the tail end of the sluice-box, and adapted to be rotated by the water as it is discharged from the sluice-box or trough; but other power may be used for this purpose, if desired, although the water-wheel furnishes a ready means for the purpose, as it can be driven by the waste water of the sluice-box or trough, thereby saving the expense and trouble of providing other motive power.

In the form of construction shown power is communicated to the shaft C by the miter or gear wheel *i*, supported in suitable ears or bearings *j*, on the shaft of which wheel *i* is a pulley for a belt, K, which belt passes over a pulley on the shaft of the water-wheel, so that by the revolution of the water-wheel the belt will drive the wheel *i* and through it the wheel *h* and shaft C.

The receptacles or troughs T are located at the tail end of the sluice-box or trough, to receive the water and catch the material, if any there be, which escapes by not entering the slots *a*. These receptacles are supported on legs U, which legs, if desired, may be provided with wheels, by means of which the receptacle, when full, can be pulled out of the way to be emptied and another be pushed into place, thereby increasing the facility with which they are handled. A pipe or hose is provided to flush or wash the receptacles T, which is connected with a coupling, Y, on the pipe O for supplying water to the pipe or hose X, the wa-

ter being cut off or let on by a suitable valve or plug (not shown) operated by the stem *o*.

In so far as relates to the means for driving the shaft C and operating the slides or cleaners *b*, other means than those shown and described can be used, and, if desired, independent means might be provided for operating the shaft and for operating the slides or cleaners.

In operation the material is dumped or deposited in the receptacle R, and water is thrown into the receptacle against the material from the hose or discharge O, the action of the water disintegrating the mass of material, the disintegrated portion as fast as separated passing with the water down the sluice-box or trough. As the material descends the heavy portion naturally sinks to the bottom, where it enters the slots or openings *a* and passes into the receptacles B, and the portion so entering will be still further separated by the action of the stirrer or beaters, as before described. In the transit down the sluice-box or trough a portion will enter the first opening or slot *a* and pass into the first receptacle, and when the next opening or slot is reached another portion will enter therein and pass into the receptacle for such slot, and so on until the last opening has been reached and passed, by which time all the heavy or valuable portion will have been pretty effectually precipitated and deposited in the receptacles, to be then acted on still further by the beaters.

When the material is to be removed the gate or shut-off *d* of each opening is closed to prevent further entrance of the material until after the receptacles have been emptied through the hand-hole or opening *f*, and the water from their pipes P, the flow of water from these pipes being shut off until the sluice-box or trough is in operation.

To prevent rocks, stones, and other large substances from passing down the sluice-box or trough, rods or cross-bars *p* are provided at the entrance, against which such substances will strike and be caught and held until removed by hand, care being taken to keep such substances removed, so that they will not interfere with the passage of the material.

By means of this apparatus it will be seen that an effectual separation of the material will be had, and that such separation will be very perfect, as it is subjected to a double action—that of the water in the sluice-box or trough and that of the beaters or stirrers in the sections or receptacles.

The receptacles or sections should be of a convenient length to enable access to be had for the purpose of removing the material.

By using slides or cleaners operating in the slots or openings *a*, it will be impossible for such slots or openings *a* to become clogged and thereby stop the inflow of the material to the sections or receptacles.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. The sluice-box or trough A A', provided with transverse slots or openings *a*, and semi-cylindrical sections or cylinders B, located beneath the sluice-box or trough and communicating therewith through the slots or openings *a*, in combination with the slide or clearer *b* and mechanism for reciprocating the same, substantially as and for the purposes specified.

2. The sluice-box or trough A A', provided with transverse slots or openings *a*, and semi-cylindrical sections or receptacles B, located beneath the sluice or trough and communicating therewith through the slots or openings *a*, in combination with the slide or clearer *b*, shaft C, provided with the stirrers or agitators D, and suitable mechanisms for reciprocating the slide or clearer and driving the shaft C, substantially as and for the purposes specified.

3. The sluice or trough A A', provided with transverse slots or openings *a*, and semi-cylindrical sections or receptacles B, communicating with the sluice or trough through the slots or openings *a*, in combination with the slide or clearer *b*, reciprocating bar M, arm L, rock-shaft K, and mechanism for rocking the shaft K and reciprocating the bar M and causing the slide or clearer to keep the slots or openings clear and free, substantially as and for the purposes specified.

4. The sluice or trough A A', provided with transverse slots or openings *a*, and semi-cylindrical sections or receptacles B, communicating with the sluice or trough through the slots or openings *a*, in combination with the slide or clearer *b*, reciprocating bar M, arm L, rock-shaft K, connecting-links J I, crank or crank-shaft H, pulleys F E, shaft C, and mechanism for driving the shaft C, all substantially as and for the purposes specified.

5. The sluice or trough A A', provided with transverse slots or openings *a*, and semi-cylindrical sections or receptacles B, located beneath the sluice or trough and communicating therewith through the openings *a*, in combination with the stirrers or agitators D, located and revolving in the sections or receptacles, shaft C, beveled-gear wheels *h i*, bearings *j*, pulley *k*, and water-wheel S, for driving the shaft and revolving the stirrers or agitators from the waste water of the sluice, substantially as specified.

6. The sluice or trough A A', provided with transverse slots or openings *a*, semi-cylindrical sections or receptacles B, located beneath the sluice or trough and communicating therewith through the slots or openings *a*, stirrers or agitators D, located and operating in the sections or receptacles B, shaft C, water-wheel S, an intermediate mechanism for imparting a rotary movement to the shaft from the water-wheel, in combination with the slides or clearers *b*, reciprocating bars M, oscillating arms N, rock-shaft K, crank or crank-shaft H, and a connection between the crank and rock-shaft, pulley F, and pulley E on the shaft C, for revolving the stirrers or agitators, and reciprocating the slides or clearers from the waste water of the sluice or trough, substantially as and for the purposes specified.

7. The sluice or trough A A', provided with the transverse slots or openings *a*, semi-cylindrical sections or receptacles B, communicating with the sluice or trough through the openings *a*, stirrers or agitators D, located and revolving in the sections or receptacles B, shaft C, and a driving mechanism therefor, in combination with the receptacle R, for the material to be washed, water-supply pipe O, and hose-discharge Q, substantially as and for the purposes specified.

8. The sluice or trough A A', provided with the transverse slots or openings *a*, semi-cylindrical sections or receptacles B, communicating with the sluice or trough through the slots or openings *a*, slides or clearers *b*, and a mechanism for reciprocating the same, stirrers or agitators D, shaft C, and a mechanism for revolving the shaft, in combination with the receptacle R, water-supply pipe O, and hose-discharge Q, substantially as and for the purposes specified.

9. The sluice or trough A A', provided with the transverse openings *a*, and semi-cylindrical sections or receptacles B, communicating with the sluice or trough through the openings *a*, in combination with the troughs or receivers T, discharge-pipe X, and water-supply pipe O, substantially as and for the purposes specified.

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Witnesses:

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