No. 879,825. PATENTED FEB. 18, 1908.

J. S. MARQUETTE.

AMALGAMATOR.

APPLICATION FILED FEB. 9, 1907. 2 SHEETS—SHEET 1.

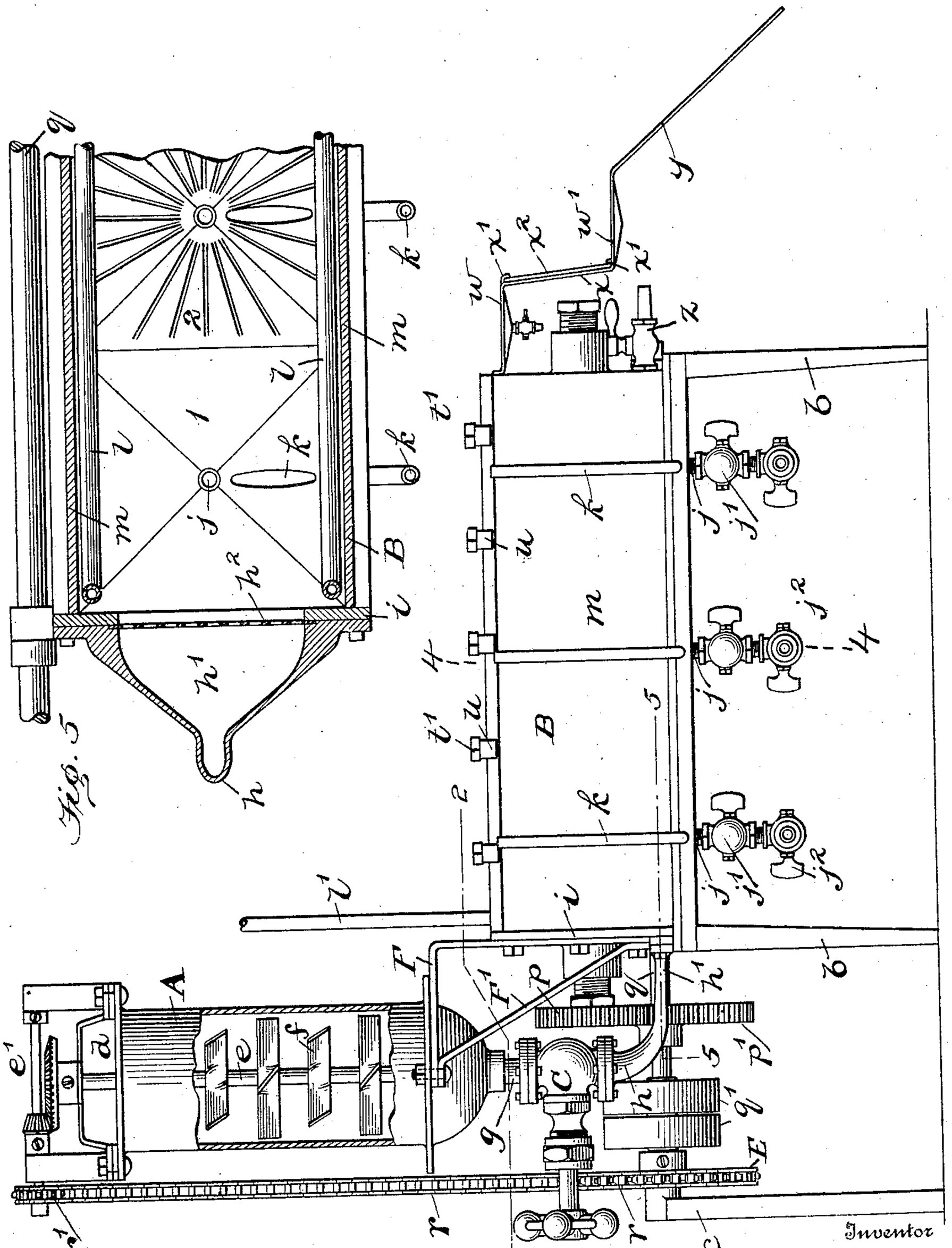

Fig. 1.

Witnesses

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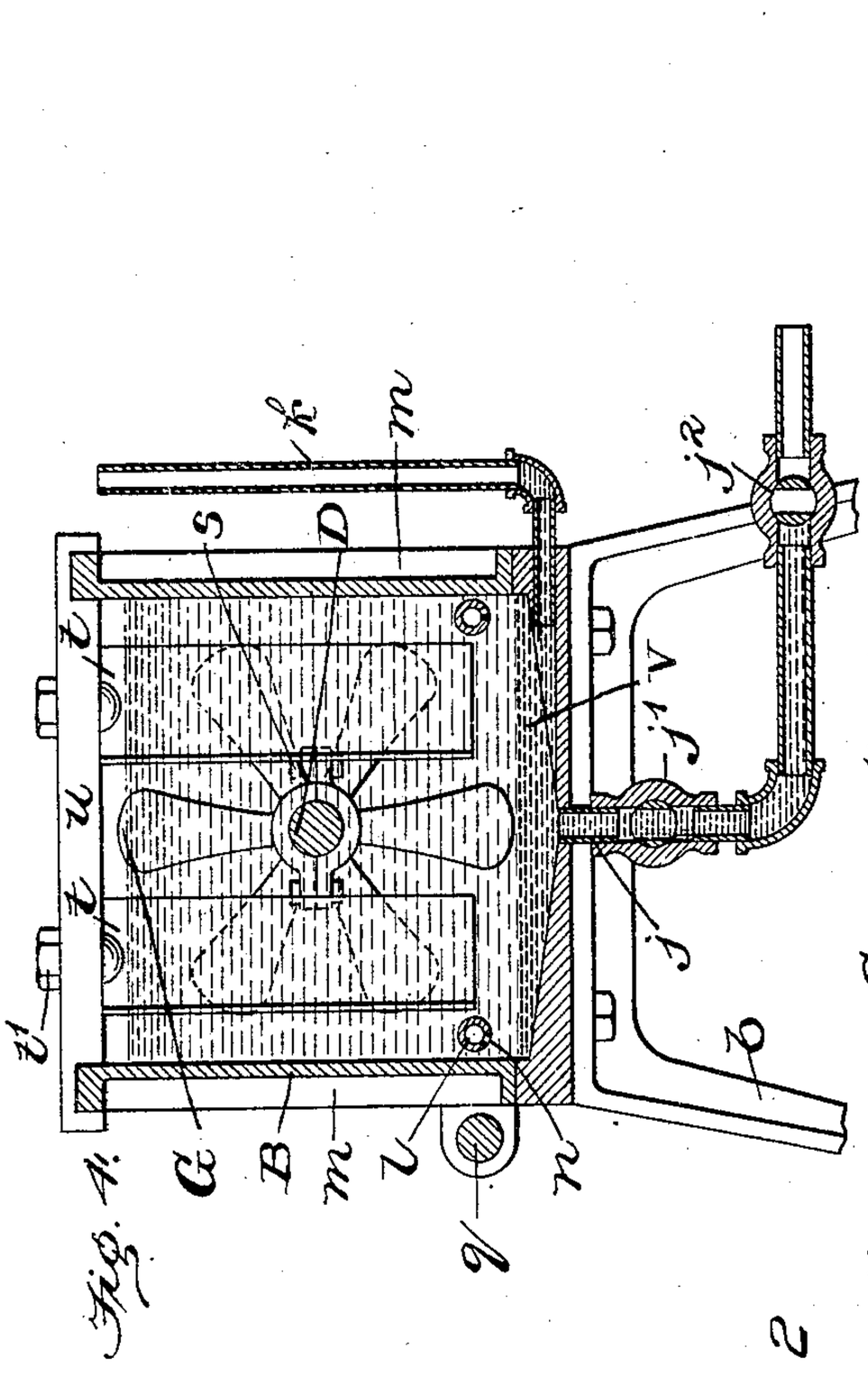
2 SHEETS—SHEET 2.



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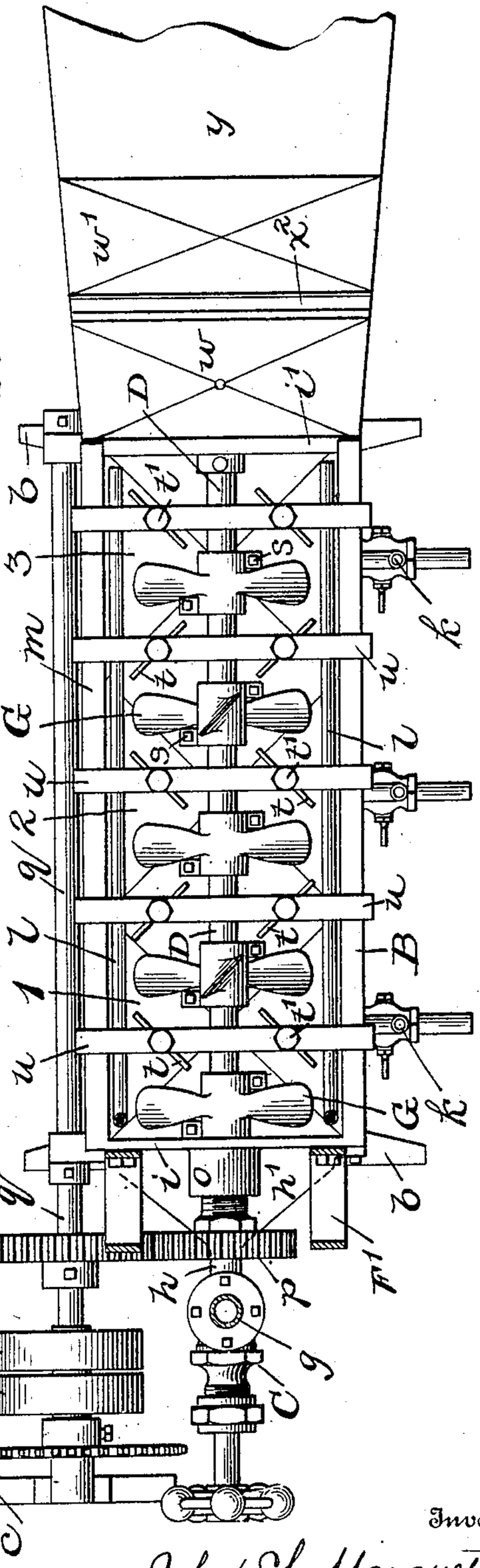

Fig. 2

Fig. 3.

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AMALGAMATOR.

No. 879,825. Specification of Letters Patent. Patented Feb. 18, 1908.

Application filed February 9, 1907. Serial No. 356,609.

To all whom it may concern:

Be it known that I, JOHN S. MARQUETTE, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Amalgamators, of which the following is a specification.

This invention relates to improvements in amalgamators—a machine employed to bring powdered ore containing fine particles of gold and silver, into close contact with mercury, for the purpose of separating the powdered rock and precious metals through the affinity of the latter for the mercury.

The object of the invention is to provide not only improved mechanism, but mechanism so organized that it will effect an improved operation in agitating the solution of water and pulverized rock in the presence of numerous mercury-coated plates, without agitating the mercury itself.

The invention is illustrated in the accompanying drawing in which,—

Figure 1 is a side elevation of the machine, the elevated preparatory tank of which is in vertical section. Fig. 2 is a plan view showing the machine except the preparatory tank, which is removed, a section of its discharge pipe being shown at line 2—2 of Fig. 1. Fig. 3 is a plan view of the upper end of the preparatory tank. Fig. 4 is a vertical cross-section of the amalgamation tank on the line 4—4 of Fig. 1. Fig. 5 is a horizontal section of the amalgamating tank on the line 5—5 of Fig. 1, showing the bottom of the tank and pipes and the horizontally-broad but vertically-shallow solution-inlet.

These drawings show one form of embodiment of my invention, but it is to be understood that the construction may be varied from that shown.

The mechanism for preparing the pulverized rock into a solution in the elevated tank, A, and the mechanism moving in the amalgamating tank, B, are connected. The machine is to be supported on suitable legs, *b*, *c*. The pulverized rock containing the metal to be amalgamated, is to be introduced into the elevated tank, A, at its open top, *d*, whereat a supply of water is also to be entered by means of a pipe or hose, not shown. A shaft, *e*, is in this tank and is provided with suitable blades, *f*, to stir and mix the solution of powdered rock and water which is often termed pulp.

The amalgamator tank, B, is situated in a lower plane than the solution tank, A, in order that the discharge pipe, *g*, of the latter may connect with the internal passage extending through the peculiar metal connection leading into the end of the amalgamating tank. This metal inlet connection is shown in Figs. 1, 2 and 5. A globe valve, C, separates the said discharge pipe, *g*, and said inlet *h;* and this valve enables the pulverized rock solution to be either partially or completely cut-off from the amalgamating tank, B. The peculiarity of shape of this inlet connection, *h*, consists in its upper receiving end being round where it connects with the valve, C, and then curving down and laterally and its lower part broadening so as to discharge in a horizontal direction through the end-wall of the amalgamating tank, B. The lower lateral and horizontal part, h^1, of this inlet is very greatly broadened, as may be seen in Fig. 2, where a top, exterior view of the said inlet pipe may be seen, and also seen in Fig. 5, where a top view of a horizontal section of the broadened inlet is shown. This makes the inlet at the end-wall, *i*, of the amalgamator tank horizontally broad but vertically-shallow, whereby the rock solution will be delivered into said tank through the end-wall and close to the bottom in the form of a thin, broad stream spread crosswise of the bottom of the tank which facilitates the uniform dispersion throughout the tank of said rock solution.

If preferred a screen, h^2, see Fig. 5, may be used at the end wall to cover the broad end of the inlet where it enters the tank, B. The bottom of the tank, B, is divided into several depressed sections, 1, 2, 3, seen in Figs. 2, 4, and 5. An outlet pipe, or draw-off, *j*, opens at the bottom center of each depressed section, and each of these pipes is provided with two valves, j^1, j^2, which are spaced apart as plainly shown in Fig. 4. These valves draw off amalgamated mercury and gold. Each depressed bottom section also has opened into it the inlet end of a stand-pipe, *k;* as in the present instance there are three depressed bottom-sections, so there are three stand-pipes, *k;* these pipes are for replenishing the said depressed bottoms with a fresh supply of mercury. The depressed bottoms, or either of them, may be merely plain surfaces, sunk or dishing at the center, as the first one shown in Fig. 5, designated, *l;* or these bottoms may be radially fluted or corrugated

and at the same time sunk or dished at the center, as the second one shown in Fig. 5, designated, 2.

Water-supply pipes, *l*, two in number, extend horizontally along the bottom, or near the bottom, of the amalgamating tank, B, one pipe being at each side adjoining the side walls, *m*. These horizontal pipes, *l*, have on the under surface a number of small holes, *n*, extending in a row along the length of the pipe, and the jets of water discharging downwardly from these holes, serve to wash out any pulverized rock that may accumulate at the crevice or angle formed by the joinder of the bottom and the said wall, *m*. A stand pipe, l^1, shown in Fig. 1 projecting upward above the tank, B, connects with each perforated horizontal pipe, *l*, at the bottom of the tank and the water supply that enters the tank comes through these stand pipes.

A horizontal shaft, D, extends through the tank, B, and has suitable bearings at each end of the tank. Suitable means are employed to impart revoluble motion to the shaft, D, and obviously this means or construction may vary. In the present instance an end of the shaft, D, projects through the end of the tank, B, and a suitable stuffing box or gland, *o*, is employed to make a water-tight joint while allowing the shaft to revolve. The projecting end of the shaft outside of the stuffing-box has a pinion, *p*, which gears with another pinion, p^1, on a shaft, *q*, on the exterior of the tank. The said exterior shaft, *q*, has fast and loose pulleys, q^1, for a driving belt, and a sprocket wheel, E, while a chain, *r*, connects from said sprocket wheel to a sprocket, r^1, on a shaft, e^1, at the top of the elevated solution-tank, A, and this shaft, e^1, is connected by means of bevel wheels with the shaft, *e*, which extends through the solution tank.

The elevated solution tank, A, may be supported in any preferred manner at a greater height than the amalgamating tank, B. In the present instance in the drawing, and for convenience of illustration, the tank, A, is shown as resting on bracket support, F, F^1, attached to the tank, B. The shaft, D, in the amalgamating tank is provided with propeller-shaped blades, G; these have half-hubs and two half-hubs come together around the shaft, D, and the two halves are fastened together by bolts, *s*, which secure the blades to said shaft.

The amalgamating tank, B, has an open top, and mercury-coated baffle plates, *t*, have vertical position in the tank and are suspended from cross-bars, *u*, extending across the top of the tank, that is the cross-bars rest on the top edges of the walls of the tank, while the plates, *t*, hang pendent from the cross-bars, being fastened by some suitable device such as a bolt and nut, t^1, which permits the plates to be readily removed for cleaning. The baffle plates, *t*, have a diagonal position in the tank, B, but this position may be changed, or one plate be diagonal reversely with respect to the one next to it; this readiness of changing position is due to the single swivel bolt, t^1, shown, for hanging the plates, *t*, from the cross-bars, *u*.

It will be seen by reference to Fig. 4 that the lower end of the baffle plates, *t*, do not extend as far down into the tank, B, as the lowermost end of the blades, G, when revolving; this allows the solution to pass below the ends of the plates, *t*. It will also be seen that the blades, G, in revolving turn only in the solution of water and rock and said blades do not stir or agitate the mercury, *v*, at the bottom of the tank and below the said solution.

When the machine is in operation the depressed bottom sections of the tank, B, contain mercury, V, and above the mercury the tank contains the solution of pulverized rock and water. This solution from the elevated mixing tank descends through the passage, *g*, *h*, under the pressure due to the elevation, and as this passage extends down and laterally in the form of a curved elbow, the lower lateral part, h^1, will deliver the solution in the form of a thin, broad stream close to the mercury-contained bottom-sections and with such pressure as to insure that the incoming stream will push its way below the lower ends of the baffle-plates, *t*, and through the body of the solution that fills the tank. This operation is largely due to the down-curved and laterally-broadened connection, *h*, h^1. After the solution has been in contact with the mercury in the depressed bottoms, and the mercury-coated plates, *t*, which abstracts the fine particles of gold or silver, said solution passes from the tank by overflowing the end wall, i^1. I have attached at this overflow end one or more mercury-coated shelves, *w*, and w^1, which are depressed or dished at the center in order to retain some of the solution. These shelves are shown in Figs. 1 and 2. One of them or both of them may have a central outlet controlled by a cock. The uppermost shelf, *w*, is attached at the exterior and at the top edge of the overflow end, and an inclined fall-board, *x*, connects the said upper and lower shelf; this fall-board has slide flanges or grooves, x^1, and a mercury-coated plate, x^2, fits in these slide flanges and is movable therein.

The operation of the shelves and removable fall-board is as follows: These shelves and the removable board, x^2, are coated on one surface with a film of mercury in the well-known manner, and when the solution from the tank overflows the end wall, i^1, said solution fills the upper shelf, *w*, and then flows down across the inclined removable mercury-coated plate, x^2, to the second shelf, w^1, any fine particles of gold or silver

will thus be saved by adherence to the shelves or plate. The waste solution is then carried off by the drain board, *y*, attached to the lower shelf.

The overflow end of the tank has at or near the bottom a draw-off cock, *z*, by means of which the solution in the tank can all be withdrawn.

The solution in the tank, B, is moderately agitated by the revolving blades, G, which has the effect to bring different parts of the solution in contact with the mercury, *v*, at the bottom of the tank without agitating the mercury itself. As the revolving blades G, are of the propeller type, that is have a pitch, they have the effect to push the solution directly against the diagonal sides of the pendent mercury-coated plates, *t*.

By removing the plates, *t*, at intervals, and by drawing off at the bottom the amalgam solution through the valves, j^2, and, j^2, the accumulations of abstracted gold and silver may be collected for subsequent treatment.

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

1. In an amalgamator, the combination of a horizontal tank provided with an end-wall over the top edge of which the waste pulp solution from the tank will overflow and having one of its walls near the bottom provided with a narrow slot; a pulp supply above said tank, and a tubular connection therefrom extending down and laterally in the form of a curved elbow, and said lateral part being broadened in the horizontal direction and narrowed in the vertical direction and said broadened part connected with the narrow slot in the tank, whereby the supply of pulp in the form of a thin broad stream will enter the tank near its bottom and be projected into the body of the solution which fills the said tank.

2. In an amalgamator, the combination of a horizontal tank; mercury-coated plates with flat sides and pendent within the tank and said flat sides in a diagonal position, and a horizontal revoluble shaft provided with propeller blades, whereby the pitch of said blades will push the solution directly against the said diagonal plates.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN S. MARQUETTE.

Witnesses:

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CHARLES B. MANN, Jr.