

A. T. LADD.  
Amalgamator.

**No. 220,978.**

**Patented Oct. 28, 1879.**

Fig. 2.

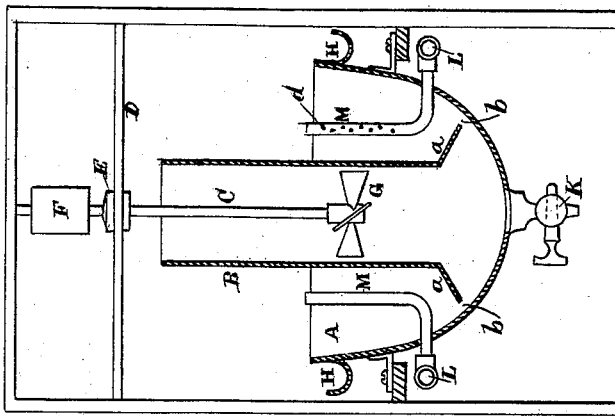
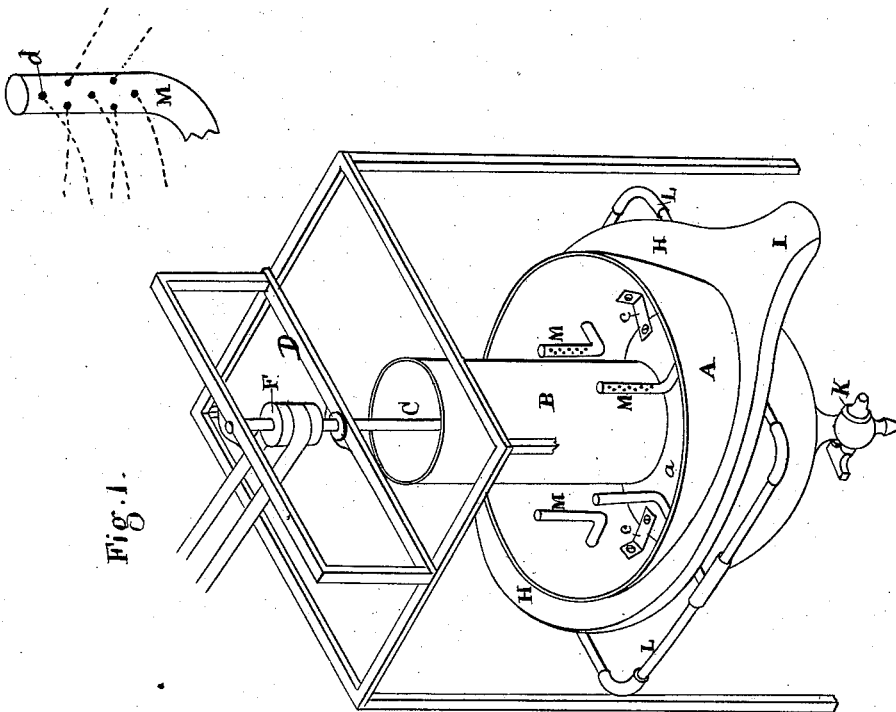


Fig. 1.



Witnesses

Geo. H. Strong,  
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Inventor

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*Aurelius J. Ladd*  
 By *Dewey & Co. Attys*

# UNITED STATES PATENT OFFICE.

AURELIUS T. LADD, OF SAN FRANCISCO, CALIFORNIA.

## IMPROVEMENT IN AMALGAMATORS.

Specification forming part of Letters Patent No. **220,978**, dated October 28, 1879; application filed March 19, 1879.

*To all whom it may concern:*

Be it known that I, AURELIUS T. LADD, of the city and county of San Francisco, and State of California, have invented an Amalgamator; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention relates to certain improvements in that class of amalgamators in which the ore is forced through a bath of mercury in a bowl or tank; and my improvement consists in pipes perforated on one side and placed in the bowl in such a position that water injected through the perforations will spread and break up lumps of ore and prevent it from packing or settling. The water which is thus admitted to the bowl dispenses with the necessity of the use of stirrers, and keeps the pulp in such a state that the particles of quicksilver and gold can readily settle, while the tailings pass off freely over the edge of the bowl and are carried away by an encircling inclosed trough, as is more fully described in the accompanying drawings, in which—

Figure 1 is a perspective view of invention. Fig. 2 is a vertical section of the same.

The pan A is bowl-shaped, about as wide as it is deep, and is made of iron. Inside of this, and projecting above it, is a cylinder, B, made of a large proportionate size, and having a downwardly-inclined flange, *a*, around its lower edge, which, when the cylinder is in position, extends nearly to the side and bottom of the bowl, leaving a very narrow opening, *b*, between the outer edge of the flange and the side of the bowl. This cylinder is supported in the bowl by the bars or supports *c*. Inside of this cylinder is a vertical shaft, C, which is supported at its upper end on the frame D by means of a collar, E, a similar collar being placed on the under side of the frame to prevent the shaft being forced upward by the propeller. On the upper end of this shaft is a pulley, F, by which the shaft is rotated by means of a belt. At the lower end of the shaft is a propeller, G, similar in shape to that used in the propulsion of vessels, and having any desired number of blades.

The cylinder B is made of a size which admits of the use of a large propeller of great

power to force the slum which is emptied into the upper end of the cylinder down under the quicksilver which is in the bottom of the bowl, and through the narrow opening *b* between the outer edge of the flange and the side of the bowl. The bowl, by being made with a broad flare, as shown, admits of the slum, after passing through the opening, spreading out and becoming thinner by the water afterward introduced, as hereinafter described. By the pulp being thus thinned, any particles of mercury which should be forced up would have an opportunity to fall back by their own gravity into the mass at the bottom, thus preventing any loss.

Around the outside of the bowl is placed a circular inclined trough, H, having a spout, I, by which the tailings overflowing from the bowl are carried off. At the bottom of the bowl is placed a draw-off cock, K, by means of which the amalgam and mercury may at any time be removed from the bowl and retorted without loss of time being incurred in cleaning up.

Around the under part of the bowl is the water-supply pipe L, from which project up through to the interior the vertical pipes M, which are provided with perforations *d* on one side, as shown. These perforations are so made in the pipes that the water issuing from them will come out in a peculiar manner. The central line of holes in each pipe throws the water out in a line corresponding to a circle drawn around the central shaft. The outer line of holes directs the water to the outside of the bowl, and the inner line of holes directs it toward the cylinder B at the center of the bowl. The action of the water in entering the bowl in this manner is such as to make cross-currents in the pulp, though all in the same general direction, the holes being in one side only, and the pulp is thoroughly stirred and thinned, allowing the particles of amalgam and mercury to work through it by gravity, while the tailings are kept so stirred up as to flow off with the water over the edge of the bowl. The pulp thrown to the outside by the outer line of holes on impinging on the bowl is directed back again toward the center, and again thrown out or in, as the case may be, thus being thoroughly mixed and stirred, and not allowed to

settle, the cross-currents being formed by each separate pipe in the bowl. As the holes are only on one side of the pipe the whole mass is swept in a circle around the bowl in one direction, the cross-currents being formed by the same power which creates the circular current.

The pulp from the stamps is poured in at the top of the cylinder B with a certain amount of water, and is immediately forced down through the mercury at the bottom of the cylinder by the action of the propeller-blades, the particles of precious metal being thus amalgamated. The tailings then pass out of the opening *b*, being directed outward by the flange on the bottom of the cylinder, and rise up in the bowl outside the cylinder. As the tailings thus rise they are very much thinned by the additional water admitted through the holes in the pipes, as described.

It will be noticed that the pulp, instead of coming into the mercury very thin, passes through the mercury in a condition favorable for amalgamation without so much water coming with it as to cut up the mercury into globules. After passing through the mercury and rising in the bowl it is thinned by the additional water admitted through the pipes, and any particles of amalgam or mercury which may have been forced out under the flange will have an opportunity of settling by gravity and not be carried off.

By using the water-pipes I am enabled to dispense entirely with arms or stirrers to keep the pulp stirred up, and with the attendant gearing necessary to give them motion. A great deal less power will therefore operate my machine than those in which stirrers are needed. The stirrers are impracticable, for the reason that when the mill stops running from any cause the slum will settle down and

confine the arms or stirrers, so that the machine cannot be started up until the sand around them is removed. The water from my pipes will keep the pulp moving whether the mill runs or not.

Whenever rods or stirrers are introduced in the quicksilver to agitate it, the quicksilver will be "floured" and will flow off. This would be the case with the propeller, also, if it were submerged in the mercury.

The shaft on which my propeller is placed has its bearings entirely outside the bowl, and the propeller at the lower end of the shaft is above the mercury so far as not to disturb or agitate it; so the ore is forced through the quiescent mass, and no loss of mercury occurs.

I use no copper or amalgamated plates for collecting amalgam, as such things take time to clean up, during which time the mill would have to stop.

In cleaning up my bowl I simply draw off the amalgam and mercury from the cock underneath and retort it at leisure, all the valuable contents being at the lowest point of the bowl. This would not cause five minutes' stoppage of the mill.

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

In combination with the cylinder B and bowl A, the pipes M, provided on one side with openings *d*, whereby streams of water are injected in one direction around the pan, as set forth.

In witness whereof I have hereunto set my hand.

AURELIUS T. LADD.

Witnesses:

FRANK A. BROOKS,  
CHAS. G. YALE.