J. ABSTERDAM.

Vacuum Amalgamating Apparatus.

No. 221,990. **Patented Nov. 25, 1879.**

Fig. 1.

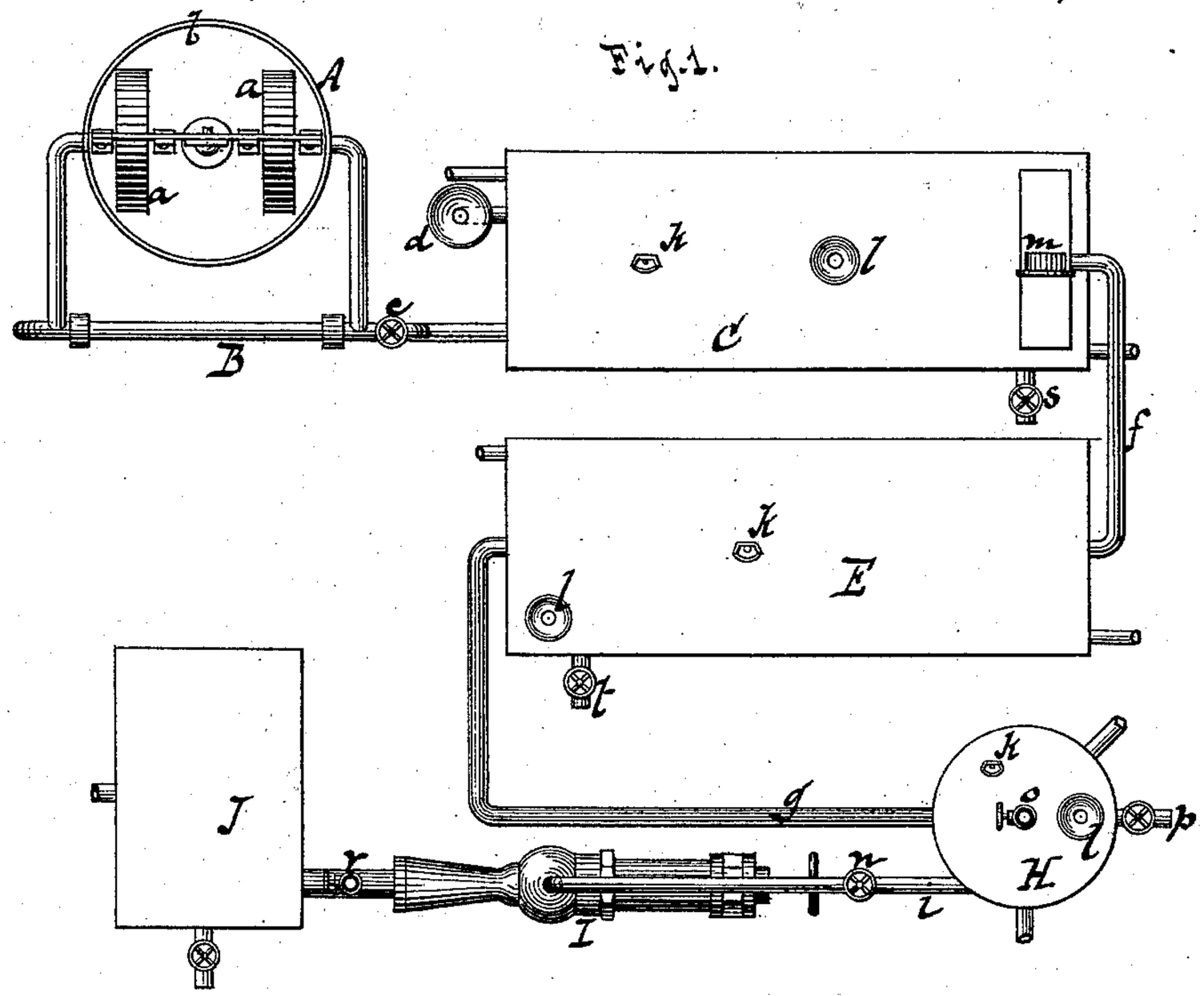
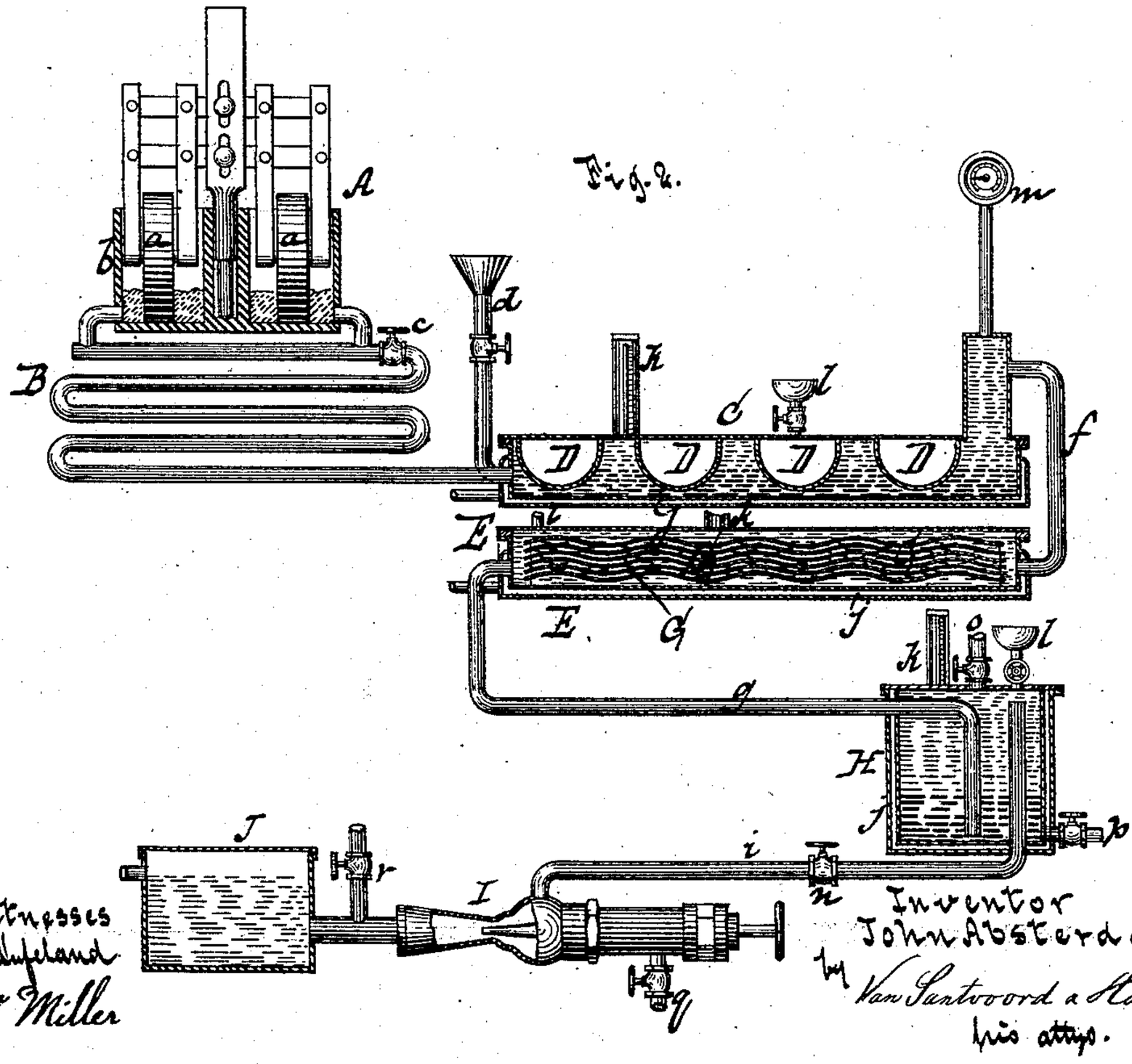


Fig. 2.



Witnesses
Otto Sutpland
Wm Miller

Inventor
John Absterdam
by Van Santvoord & Hauff
his attys.

UNITED STATES PATENT OFFICE.

JOHN ABSTERDAM, OF NEW YORK, N. Y.

IMPROVEMENT IN VACUUM AMALGAMATING APPARATUS.

Specification forming part of Letters Patent No. **221,990**, dated November 25, 1879; application filed October 22, 1879.

To all whom it may concern:

Be it known that I, JOHN ABSTERDAM, of the city, county, and State of New York, have invented a new and useful Improvement in Vacuum Amalgamating Apparatus, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan or top view of my apparatus. Fig. 2 is a longitudinal vertical section of the same.

Similar letters indicate corresponding parts.

This invention relates to that class of amalgamating apparatus in which the pulverized ore or sand travels through one or more amalgamating-boxes under exhaust, and where the amalgamation is sometimes assisted by first commingling the ore and mercury into a pulp or slime, and drawing the same through a channel and amalgamating chambers or boxes under exhaust.

The invention consists in the combination, in an amalgamating apparatus, of one or more amalgamating-boxes provided with deflectors, connected with an ore supply by a suitable passage-way, a liquid trap or washer connected with the amalgamating box or boxes, and exhaust mechanism connected with said trap or washer in such manner that when said exhaust is operated an ore-pulp supplied to the amalgamating box or boxes will be drawn through said box or boxes and trap or washer, and the precious metal in said pulp will be brought into intimate contact with amalgamating devices or material in said box or boxes and trap, and retained thereby, while the worthless and non-metallic portion of the pulp will be carried off and discharged. The pulp may be, if it is found desirable, delivered by the exhaust mechanism into a final washer, in which any of the amalgamating material drawn through the exhaust mechanism will settle and may be recovered.

The letter A designates an amalgamating-mill, consisting in this example of two run of stones, *a a*, arranged in a circular trough, *b;* and B is a coil of pipe extending from the mill. This coil B has a connection with the mill A at two opposite points, as shown, and it is provided with a valve, *c*. The letter C designates a box or chest joined to the tail end of the coil B, so that this box connects with the mill A by means of the coil. In lieu of this arrangement, however, the box C may be provided with a hopper, *d*.

The box C is constructed with a series of partitions or projections, D, which run transversely to such box and terminate above the bottom thereof, the same being in this example shaped with a semicircular cross-section.

The letter E designates a secondary box or chest, connecting with the box C by a pipe, *f*. This box E contains a series of plates, G, which are corrugated and separated from each other, as by ribs arranged between them, so as to divide the box E into a series of undulating channels, as clearly shown. The plates G are amalgamated in any usual or suitable manner.

The letter H designates a liquid trap or washer, connecting with the box E by a pipe, *g*. This pipe *g* extends into the trap H, and terminates a short distance above the bottom thereof, while from a point near the top of the trap extends a pipe, *i*. This pipe *i* has a valve, *n*, and connects with an air-exhauster, I, which in turn connects with a washer, J. The exhauster I has a steam-inlet valve, *q*, and a cock, *r*, for supplying the washer with water, and it operates in a well-known manner.

The two boxes C E and the trap H are, respectively, provided with a steam-jacket, *j*, and a thermometer, *k*, also with a cup, *l*, for supplying the same with mercury. The box C, moreover, is provided with a vacuum-gage, *m*, and a cock, *s*, Fig. 1, while the trap H has two cocks, *o p*, one at the top and the other at the bottom thereof.

In applying my apparatus to use I introduce suitable quantities of mercury into the box C and the trap H. I also fill the box E with a suitable number of the corrugated amalgamated plates G, and make the two boxes and the trap air-tight by means of their covers. I now introduce the comminuted ore and mercury, mixed with a sufficient quantity of water to convert the same into a pulp or slime, into the mill A, then open the valve of the coil B and that of the suction-pipe *i*, and start the exhauster I. The suction caused by the steam rushing through the exhauster I creates a

vacuum through the pipe *g* in the box E, through the pipe *f* in the box C, and through the coil B in the mill. By this means the pulp is drawn from the mill A and travels through the coil B, the boxes C E, and the trap H, whence it enters the exhauster I, and is thereby forced into the washer J, so as to pass off with the water. During this operation I allow a suitable flow of water into the trap H through the cock *o*, and into the washer J through the cock *r*.

The pulp in passing through the box C is compelled to take a circuitous or zigzag course by the partitions D, and thus flows through the mercury in such box, thereby depositing therein the mercury or amalgam entering at the mill A, or a portion thereof. In its passage through the box E the pulp is spread and brought into intimate contact with the corrugated amalgamated plates G, whereby it is deprived of the remaining portion of its precious metal. At the same time, if any of the precious metal should then remain in the pulp it is deposited in the passage of the pulp through the trap or washer H. If any mercury should happen to be blown with the pulp into the washer J it collects on the bottom thereof, and may be drawn off by a suitable waste-cock.

The mercury or amalgam is withdrawn from the box C by the cock *s*, and from the trap H by the cock *p*, while the amalgamated plates are removed through the top of the box E, the precious metal being thereupon separated from the mercury and the plates in any usual or suitable manner. Fresh mercury is then introduced into the box C and the trap H, and fresh amalgamated plates substituted for the ones removed from the box E, when the operation may be continued at pleasure.

When the ores to be treated do not require the use of the amalgamating-mill A and coil B, I introduce the comminuted ore directly into the box C by the hopper *d*, the operation being then substantially the same as when the mill and coil are used. In this case the ore may be introduced in a wet or dry state, and when wet the water may be mixed therewith in the hopper *d*, or in some other mixing-vessel connected with the hopper. The office of the coil B is to bring the mercury mixed with the ore in the mill A into intimate contact therewith.

When the ores to be treated do not require the use of the amalgamated plates G as such, I supply the box E with mercury, leaving the plates therein, so that the action of this box is similar to that of the box C. The object of using the plates G in this case is simply to divide the box E into a number of thin undulating channels, thereby bringing the ore into intimate contact with the mercury in the box. The mercury is drawn off from the box E by a cock, *t*, Fig. 1.

When the ores to be treated consist of powdered quartz containing gold, or gold and silver, one of the boxes C E is sufficient, particularly if the quantity of ore is not very large. On the other hand, the number of amalgamating-boxes may be multiplied, so as to form what may be termed an "amalgamating-train," the whole being connected to a common trap and washer.

I always keep the mercury at the proper amalgamating temperature in the amalgamating-boxes by means of steam or hot water circulating through the steam-jacket *j*, the temperature being indicated by the thermometer *k*. In the absence of mercury I use an amalgamating alloy composed of lead, about nine to ten parts; tin, five to six parts; mercury, four to five parts, by weight. In this case the ore must be used dry and heated before passing through this amalgamating alloy.

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

1. In an amalgamating apparatus, the combination of a box, C, provided with deflectors and containing mercury, and connected with an ore-supply, a secondary box, E, containing a series of corrugated plates, G, and connected at one end with the upper portion of the mercury-box by a pipe, *f*, a liquid trap or washer, H, connected by a pipe, *g*, with the other end of said secondary box, and an exhaust mechanism, I, connected with the liquid trap or washer for drawing the ore through said boxes and liquid trap, substantially as and for the purpose set forth.

2. In an amalgamating apparatus, the combination, with an amalgamating box or boxes provided with deflectors, connected by a suitable passage with an ore-supply, of a liquid trap or washer connected by a suitable pipe or pipes with the amalgamating box or boxes, an exhaust mechanism, I, connected with the said trap or washer by a pipe leading from the upper portion thereof, and a washer, J, connected with the discharge of the said exhaust mechanism, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 9th day of October, 1879.

JOHN ABSTERDAM. [L. S.]

Witnesses:
E. F. KASTENHUBER,
J. HERMANN WAHLERS.