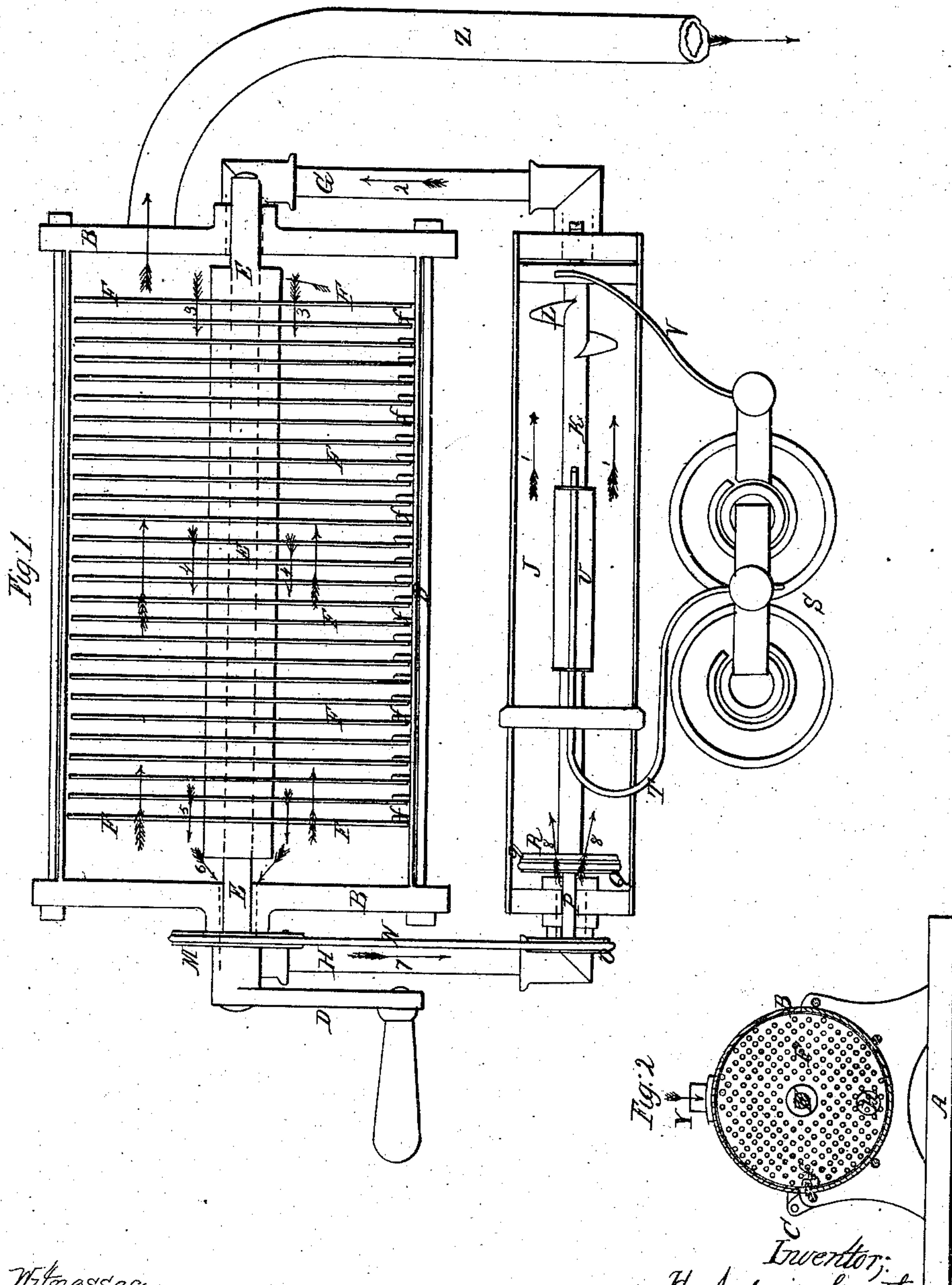


No. 66,529.

PATENTED JULY 9, 1867.

H. J. SMITH.
AMALGAMATING THE PRECIOUS METALS.



Witnesses,
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Letters Patent No. 66,529, dated July 9, 1867.

IMPROVEMENTS IN AMALGAMATING THE PRECIOUS METALS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, H. JULIUS SMITH, of Boston, in the State of Massachusetts, have invented a new and useful Improvement in the Amalgamation of the Precious Metals, and in the apparatus for that purpose; and I do hereby declare the following to be a full and correct description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a top view or plan view of my amalgamating apparatus, with the cover of the cylinder removed.

Figure 2 is a vertical section near the feed-end of the amalgamating cylinder.

The nature of my invention consists in the construction and operation of an amalgamating apparatus in which mercury is made to pass from an amalgamating chamber to and through a regenerating tank, in which its affinity for other metals is heightened by contact with a solution of a compound or salt of one of the electro-positive metals acted on by an electric current, all as hereinafter more particularly set forth.

To enable others to make and use my improved amalgamator, I will proceed to describe its construction and operation, referring to the drawings, whereon A marks the base of the apparatus; B the cylindrical amalgamating chamber, which is divided horizontally in the middle, the upper half forming a lid or cover, hinged to the lower half at C. D is a winch indicating the point of application of any suitable driving power to the shaft E, which passes through the cylinder B and turns on journals at either end. Fixed to this shaft are any desired number of circular perforated disks F F, &c., which correspond in size with the interior of cylinder B, in which they turn. They are freely perforated with small holes, as seen in fig. 2, the size of the holes having reference to the character and condition of the materials intended to be operated upon. Each disk turns in contact with a scraper, f, which keeps its edge clean. The cylinder B is connected by inlet pipe G and outlet pipe H with the regenerating tank J which stands beside it. In the lower part of this tank is placed shaft K, fixed to which is a propeller-blade, L. On the front end of shaft E is grooved pulley M, which by means of cord N turns pulley O on the end of short-shaft P, carrying at its other end pulley Q, which by cord q turns pulley R on the end of propeller-shaft K, and gives motion to the propeller-blade L. The action of this blade is to drive the contents of the lower part of the tank J out at one end of said tank in the direction indicated by the black arrows 1, 2, 3, 4, 5, 6, 7, 8, through pipe G into and through the chamber B and back through pipe H into the opposite end of the tank, keeping up a continuous circulation. S marks an electric battery of any convenient kind, communicating with the tank J by wire T leading to the positive electrode U which is suspended in the upper portion of the tank and wire V leading to the negative pole which passes to the bottom of the tank. Y marks the inlet pipe, through which the materials to be acted upon are introduced into the amalgamating chamber, and Z is the waste pipe through which the "tailings" or exhausted materials are carried off.

The operation is as follows: A quantity of mercury sufficient to fill the lower portion of the cylinder B and tank J is introduced into the apparatus. The tank J is filled with a solution of common salt or of some other compound or salt of an electro-positive metal. The battery S is put in operation and motion is imparted to shaft E. The mercury in the lower part of the apparatus, under the impulse of blade L, commences circulating in the direction indicated by the black arrows through the tank and cylinder, and in passing through tank J has its amalgamative affinity heightened by contact with the solution in the tank under the action of the electric current. The ground ore to be operated upon is suspended in water, and fed in through feed pipe Y to the amalgamating chamber B and passes through the perforated amalgamating plates F in the direction indicated by the red arrows, a direction opposite to that in which the current of mercury is flowing through the chamber, and escapes, after parting with its contained metal to the quicksilver, through the outlet pipe Z.

It will be observed that the quicksilver, after being regenerated in tank J, enters the amalgamating chamber at the outlet end for the ore, so that the ore, as it is exhausted of its metal, is constantly meeting in its passage through the chamber with mercury of increasing amalgamative power. The waste of the amalgamative energy consequent upon the rapid agitation and comminution of the mercury in presence of water in the amalgamating chamber is rapid, and by the time it reaches pipe H, to return to tank J, the amalgamative activity of the mercury is much diminished and needs the regenerative action of the tank to renew its energy for a repetition of the operation.

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

1. An amalgamating apparatus in which mercury is made to pass from an amalgamating chamber to a regenerating tank, in which its amalgamative power is increased, as described.
 2. Renewing or increasing the amalgamative energy of mercury by passing it through or bringing it in contact with a solution of one of the compounds or salts of an electro-positive metal subjected to an electric current, as specified.
 3. Causing the mercury in an amalgamating apparatus after regeneration to flow in a direction opposite to that taken by the comminuted ores on which it is intended to operate, so that the ore least charged with metal shall encounter mercury of the greatest amalgamative energy, as set forth.
 4. Directly and continuously supplying to mercury used in the extraction of metals from their ores the waste of the amalgamative energy which occurs in the process of amalgamation by bringing it into contact with a solution of one of the salts or compounds of an electro-positive metal acted upon by an electrical current, as described.
 5. Causing the ore to be operated upon to pass through revolving perforated plates in the amalgamating chamber in the manner set forth.
 6. The arrangement for conjoint operation in an amalgamating apparatus of an amalgamating chamber, regenerating tank, and electric battery, substantially in the manner and for the purpose described.
- The above specification of my said invention signed and witnessed at Boston, this twelfth day of February, A. D. 1867.

H. JULIUS SMITH.

Witnesses:

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GEO. W. ADAMS.