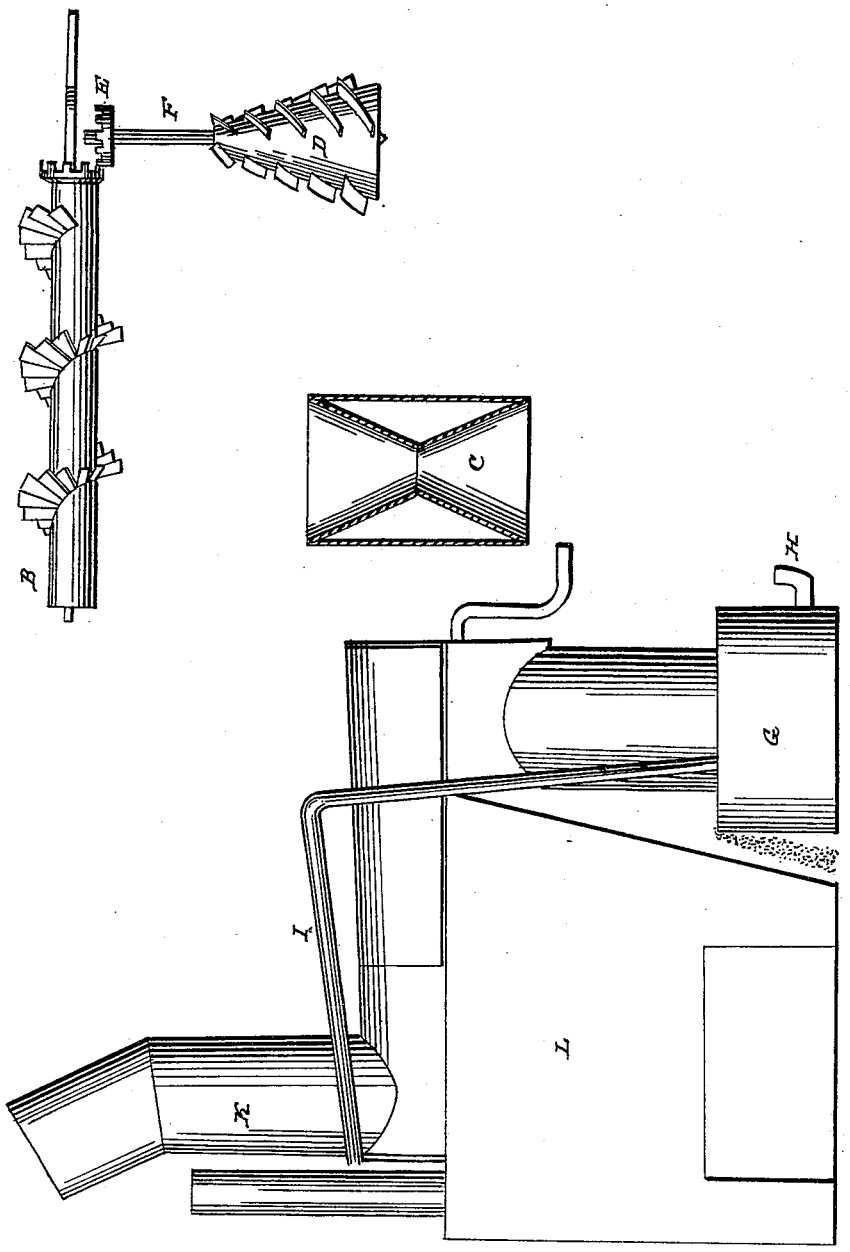
G. B. SIMPSON.

Amalgamator.

No. 54,028. Patented April 17, 1866.



WITNESSES:

W. H. Phillips
Geo. C. Lemmon

INVENTOR.

Geo. B. Simpson.

UNITED STATES PATENT OFFICE.

GEO. B. SIMPSON, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVED AMALGAMATOR.

Specification forming part of Letters Patent No. **54,028**, dated April 17, 1866.

To all whom it may concern:

Be it known that I, GEO. B. SIMPSON, of Washington, District of Columbia, have invented a new and Improved Mode of Amalgamating Gold and other Precious Metals; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying model, drawings, specifications, and the letters of reference made thereon.

The nature of my invention consists in a machine constructed as follows: The external form is composed of one horizontal iron cylinder larger at one end than at the other, and is erected over a furnace, with a perpendicular iron cylinder attached and extending upward at the smaller end and a perpendicular iron cylinder attached and extending downward at the larger end. This latter cylinder stands on four legs in an iron tub or vessel. Each of these several parts may be made of any other metal and of any required dimensions, (letter A.)

The internal arrangement is as follows: The agitator or stirrer within the horizontal cylinder consists of a wheel in the form of a screw, larger at one end than at the other, and made to conform to the interior dimensions of that cylinder. The flange, instead of being continuous, is cut into sections of equal proportions and twisted so as to set nearly or quite at an angle with the center of the shaft, (letter B.)

The interior of the perpendicular cylinder extending downward is in the form of an hour-glass, (letter C,) smallest in the center and largest at top and bottom. This arrangement is attached to and becomes part of that external cylinder which stands upon four legs in a tub or vessel. In the center of this cylinder stands a perpendicular shaft, resting on the bottom of the tub. Attached to the lower portion of this shaft is a cylinder in the form of a cone, with three rows of flanges extending from the top to the bottom of it, so arranged as to force mercury or other liquids from the surface of the mercury to the bottom of the tub or vessel upon being rotated, (letter D.) Near the top of this shaft is a cog-wheel, which connects with another cog-wheel attached to the shaft of the horizontal agitator or stirrer, so that one cannot rotate without rotating the other, (letter E.) The upper portion of this perpendicular shaft is bare, simply passing through the upper portion of the funnel form or hopper for the purpose of connecting with the horizontal shaft, (letter F.)

The iron tub or vessel may be made in any form and of any required dimensions, and may contain any given quantity of mercury or other liquids, (letter G.) The faucet at the bottom of the tub is for the purpose of drawing off and straining the mercury and other liquids, (letter H.)

The tube extending from the tub above the top of the horizontal cylinder, thence on an inclination to the rear of the upright cylinder, is for the purpose of pumping mercury or other liquids from the tub into the smaller end of the horizontal cylinder, to supply the mercury-vapor, (letter I.)

The upright cylinder is for the purpose of conducting pulverized ores from the mill into the horizontal cylinder containing the vapor of mercury, (letter K.)

The furnace may be built of any proper materials and of any required form and dimensions, having one chimney or two, as the case may require, (letter L.)

Argument: In experimenting with my closed cylinder, for which Letters Patent of the United States issued to me on the 6th of February, 1866, I demonstrated the absolute amalgamation of gold and silver with the vapor of mercury. So far as it went this imperfect experiment was a perfect success. It also demonstrated that the immensely-minute globules of the vapor of mercury, upon condensation, would not reassociate with the mass of mercury again, as does the vapor of water, but would remain in globular form so minute as to be carried off with the water and débris, unless agitated a great length of time, and requiring the greatest care in washing. It further demonstrated that the amalgam granulated in such minute particles as to require even greater care in agitating and washing to save them. These facts suggested the necessity of the present improvement.

The object of this invention is to amalgamate the precious metals with the vapor of mercury and reassociate the vaporized mercury and the granulated amalgam with the mercury again by a single process in an open

vessel. To accomplish this object I have invented this machine.

The finely-pulverized ore passes from the mill into the upright cylinder and falls upon the smaller end of the horizontal screw-wheel, which, being rotated with great velocity, instantly takes it up with its flanges, puts it in motion, causing it to assume a spherical movement, and thus carries it forward with and through the vapor of mercury, mixing them most thoroughly, until it reaches the larger end of the cylinder. Here the ore, vaporized mercury, and the granulated amalgams are all precipitated into the hopper of the perpendicular cylinder, which of necessity inclines to the center, where, falling below the center, the mass comes in contact with the perpendicular flanged cone, whose rapid rotation also instantly takes it up, and by its screw-like arrangement forces the mass down into the mercury-bath against its specific density, and below the edge of the cylinder which stands in the tub upon four legs, where the débris, from the boiling motion of the mercury passes up through it, in obedience to the law of its own specific levity, reaching the surface, and falls over the edge of the tub or vessel upon the ground. Now, where are the immensely minute globules of vapor and granulated amalgams? Evidently reassociated with the mercury again, as it is utterly impossible that they should pass up through it to the surface, being of the same density, and be swept off with the débris, thus leaving the aggregated amalgam in the mercury-bath, which may be drawn off, strained, and retorted at will.

The pump, which is connected with the gearing of the machine, pumps the mercury from the bath into the further end of the vaporizing-cylinder, thus constantly supplying with the raw material at one end that which is exhausted at the other end of that cylinder.

The cylinder leading from the mill, being open at the top, furnishes an escape for the heated or expanded air precipitated by the passage of the pulverized ore into the heated cylinder, while it offers no objection to the vapor of mercury, as it condenses at a much higher temperature than would ever be reached at that elevation, collecting on the sides of the cylinder, and then falling into the heated cylinder again.

The furnace may be so constructed as to embrace half or the whole of the vaporizing-cylinder, having one chimney or two, as circumstances may require.

If it shall be found that heat softens the axles and cog-wheels to an undue extent, the entire machinery, with the exception of the agitators and mixers, may very readily be arranged and attached on the outside of the cylinders.

If it shall be deemed advisable for the purpose of more thoroughly mixing the masses, iron spikes may be set between the flanges of each wheel, agitator, stirrer, or mixer.

It will be observed that this machine is a perpetual operator; that a continuous stream of ore passes through the vapor of mercury and is worked off through the mercury-bath, thus saving an immense amount of labor, and is worked dry. If, however, it shall be found that the débris, when ejected from the bath, carries with it small globules of mercury, which is not anticipated, it will only be necessary to attach to the other machinery, by simple gearing, a common rocker so arranged as to receive the débris as it falls over the edge of the bath-tub, and into which a stream of water is constantly passing, to save all the mercury and perfect the machine and the process.

It is confidently believed that the capacity of this machine for amalgamating the metals may be made to operate a hundred pounds of pulverized ore per minute, or three tons per hour, or seventy-two tons per day.

By simple gearing this machine may also be connected with the steam-power which operates the quartz-mill, which obviates the necessity of a separate power to operate it, thus further reducing the expense of operating this machine.

This machine is also the simplest, the most efficient, and the cheapest of any now in use, and, in my judgment, of any that can be devised.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. A horizontal cylinder larger at one end than at the other, in combination with an upright cylinder attached at the smaller end and a downright hour-glass cylinder attached at the larger end, and in combination with the furnace, pump, and mercury-bath tub.

2. The horizontal screw-flanged wheel, agitator, stirrer, or mixer, in combination with the perpendicular rotating flanged cone and external cylinders.

3. The amalgamation of gold and other precious metals by passing a continuous current of finely-pulverized ores through the vapor of mercury in an open vessel, in combination with the agitators and cylinders.

4. The reassociation of the vapor of mercury and the granulated amalgams with the mercury again, by passing them into a bath of cold mercury, which retains them, in combination with the cylinders, agitators, and the mercury-bath tub or vessel, substantially as hereinbefore described.

Washington, D. C., March 30, 1866.

GEO. B. SIMPSON.

Witnesses:

J. F. CALLAN,

M. P. CALLAN.