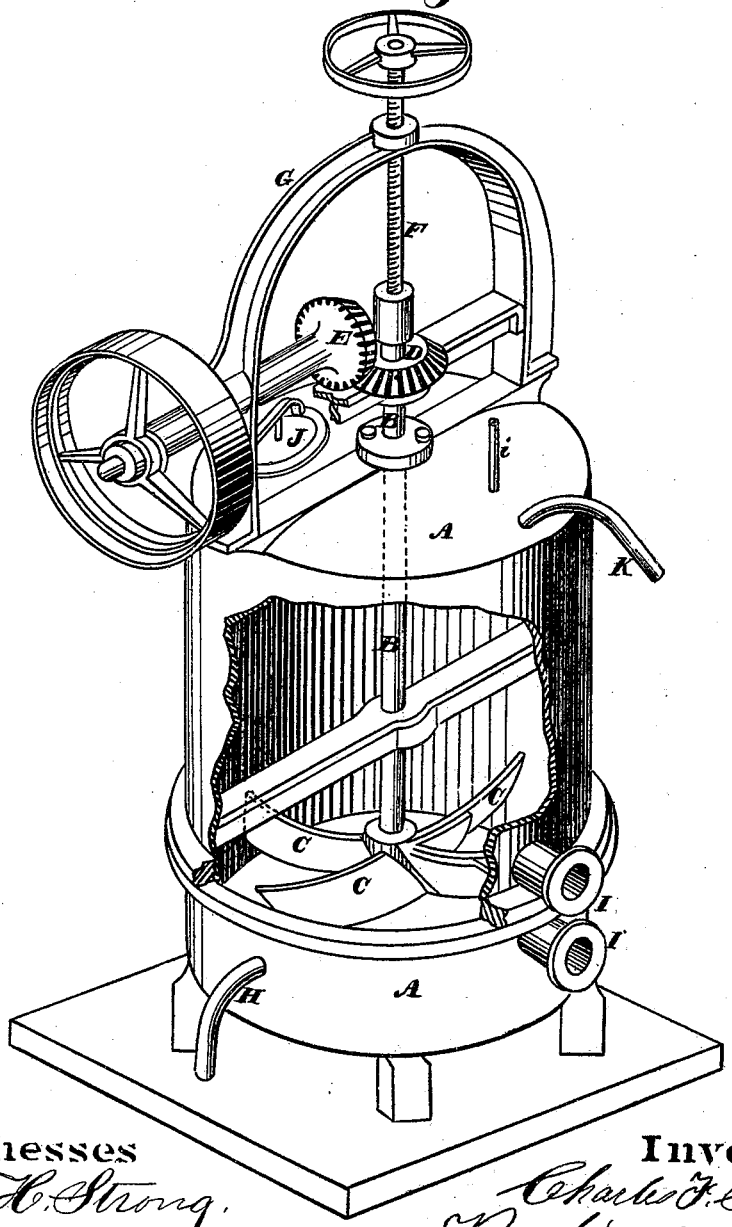
C. F. SECOR.

PROCESS OF AMALGAMATING ORES.

No. 180,657. Patented Aug. 1, 1876.

Fig. 1.



Witnesses

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CHARLES F. SECOR, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN PROCESSES OF AMALGAMATING ORES.

Specification forming part of Letters Patent No. **180,657**, dated August 1, 1876; application filed February 21, 1876.

To all whom it may concern:

Be it known that I, CHARLES F. SECOR, of San Francisco city and county, State of California, have invented a Method of Amalgamating Gold and Silver Ores; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention without further invention or experiment.

My invention relates to an improved method of amalgamating gold and silver ores, by which I am enabled to work larger charges more effectively than heretofore.

My invention consists in the employment of steam, under heavy pressure, upon the ore to be worked, the ore being inclosed in a close vessel, the steam disintegrating the ore, and subsequently affecting the mercury so that it is caused to more intimately combine with the valuable metal contained in the charge, and especially with the fine flour or float gold, now generally lost, which is forced to amalgamate.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view of my device for carrying out my process.

My process may be more or less perfectly worked in variously-constructed apparatus, but I have found the one here described to be very efficient.

A is a vessel of any suitable material, made of a size to receive such charges as it is desirable to work. This vessel is made sufficiently strong to resist the pressure of the steam which it is designed to use. Through a stuffing-box at the top of this vessel a shaft, B, passes, extending to near the bottom of the vessel, where it has secured to it the arms or mullers C. These arms are shaped so as to conform to the curve of the bottom of the vessel, and are set at an angle of about forty-five degrees, so that, as they revolve, they will scoop up the mercury and throw it upward into the mass of the pulp. The shaft B has a gear-wheel, D, secured to it by a feather, so that the shaft and mullers may be adjusted up and down at pleasure, without affecting the gear. This gear meshes with and is driven by a gear, E, upon a horizontal pulley-shaft, as shown. A screw, F, for elevating and depressing the muller-shaft, is connected with it by a loose joint, and passes through a nut upon a suitable supporting-frame, G. H is a steam-pipe, through which steam is admitted from a boiler until the desired pressure is obtained, and *i* is a gage to register the pressure. I I are discharge-passages, through which the contents, or a portion of them, from different levels can be removed. J is the man-hole, through which the charge is introduced.

The operation will then be as follows: The ore, being finely pulverized, is charged through the man-hole, there being water in the amalgamator to receive the charge. The mullers being in motion, I then add the mercury and such other chemicals as may be found necessary for the proper treatment of the particular kind of ore, and close the man-hole. Steam is then admitted at the desired pressure, which may be from five to one hundred and fifty pounds per square inch, and the temperature will be correspondingly increased. The charge is worked for two hours, after which the steam is shut off and the work continued for two hours more, until I consider the amalgamation finished. The steam which may be still contained is then let off through a small pipe, *k*, into a separator partially filled with water. The man-hole is then opened, and the charge is thinned with cold water, which allows the mercury and amalgam to fall to the bottom. When thin enough, I wash off all earthy matter, allowing it to escape through the passages I, the muller being raised, so as not to disturb the mercury and amalgam in its movements.

The amalgam may be removed through the discharge *k* at the bottom of the vessel after each charge, unless it is desired to work consecutive charges, when more quicksilver is added and new charges introduced.

If the ore be a sulphuret of gold or silver, containing a small percentage of sulphur—as from three to six per cent.—I have the ore finely crushed, then charge the amalgamator with it, omitting the mercury. The vessel is then closed, and the ore is submitted to the disintegrating effect of the high steam at from fifty to eighty pounds per square inch, until the sulphur is driven off. I then open the vessel and add the mercury, continuing the pro-

cess, as before, at a less pressure, until amalgamation is completed.

By this use of steam at a high pressure and temperature I am enabled to work ores economically, and the working results approach more nearly to those of analysis than by other methods.

I am aware that steam has been used in connection with the amalgamation of ores, both by means of steam-compartments beneath the open pans in which amalgamation is carried on, and also by introducing live steam at the ordinary atmospheric pressure directly into the pulp; but I am not aware that the use of steam under pressure within a closed vessel has ever been attempted.

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

The process herein described for treating ores, the same consisting in the application of steam under pressure in a closed vessel for disintegrating ores, and to assist in their amalgamation, substantially as herein described.

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Witnesses:
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