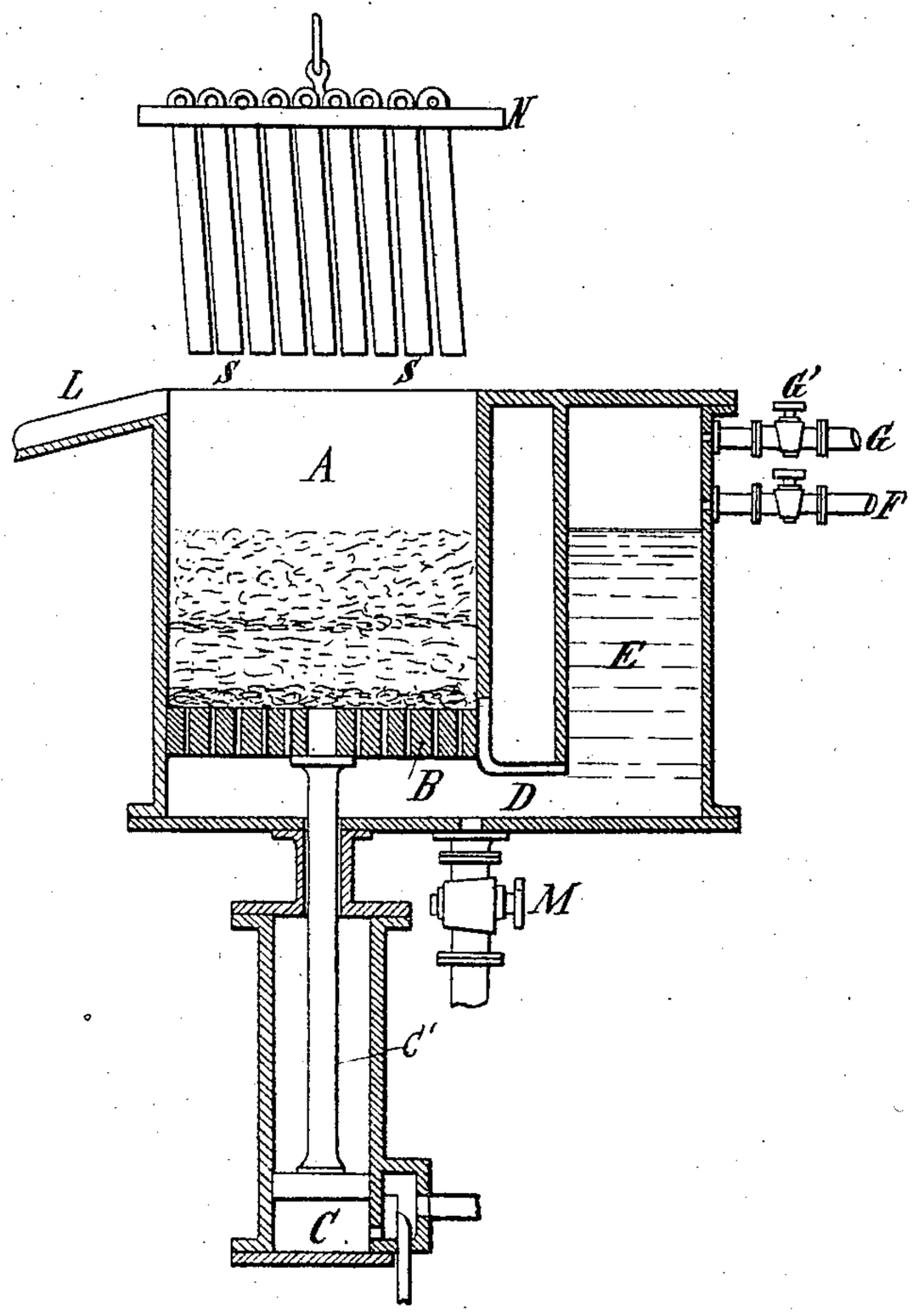
(No Model.)

J. GARNIER.

APPARATUS FOR SIMULTANEOUSLY CONCENTRATING, CLASSIFYING, AND AMALGAMATING GOLD ORES.

No. 575,755. Patented Jan. 26, 1897.



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UNITED STATES PATENT OFFICE.

JULES GARNIER, OF PARIS, FRANCE.

APPARATUS FOR SIMULTANEOUSLY CONCENTRATING, CLASSIFYING, AND AMALGAMATING GOLD ORES.

SPECIFICATION forming part of Letters Patent No. 575,755, dated January 26, 1897.

Application filed April 8, 1896. Serial No. 586,700. (No model.)

To all whom it may concern:

Be it known that I, JULES GARNIER, of the city of Paris, France, have invented Apparatus for Simultaneously Concentrating, Classifying, and Amalgamating Gold Ores, of which the following is a full, clear, and exact description.

My invention relates to an apparatus for simultaneously concentrating, classifying, and amalgamating gold ores in such manner as to admit of treating ores dry-crushed by means of rollers, separating the gold contained in the slimes in suspension in water both by gravity and by amalgamation, and economically classifying or grading the ore so that in the subsequent treatment only particles of equal richness and coarseness will be treated together.

A form of my apparatus is illustrated in the accompanying drawing.

The ore, whether obtained from alluvial deposits or finely crushed, is placed in a large sheet or cast iron tank A, in which a perforated false bottom B is fitted to be moved as a piston by the piston C. The surface of the false bottom B is constantly covered with coarse fragments of some heavy substance, such as a rich gold ore, so as to prevent the fine particles under treatment from obstructing the perforations in the false bottom B. The tank A communicates by a passage D at the bottom with a closed chamber E, which is connected at the upper part by a pipe G (under control of a cock G′) with a high-pressure steam-boiler or compressed-air reservoir, whence steam or air at high pressure may be supplied to chamber E, which is also capable of opening to the air by a stop-cock F.

The operation is commenced by nearly filling the vessels A and E with water and then introducing crushed ore into tank A, leveling the surface as far as possible, the volume of liquid in which the ore is thus immersed being in proportion to the quantity of slimes yielded by the ore. A suspended cover-plate N is provided, from which are pendent strips of amalgamated copper S. The amalgamated strips are arranged close together and present as large a surface as possible, and they are slightly inclined from the vertical so as to insure more perfect contact with the auriferous slimes. The strips are secured to the cover N by means permitting of their quick removal and replacement, as required. The cover N is lowered by means of a crane or other device, so that the strips S are plunged deeply into the liquid charged with auriferous particles in suspension. This done, the cock F is closed and steam admitted through cock G′ into cylinder E, whereby the water is forced into vat A, in which it rises, carrying with it the whole mass of ore, which is more or less in suspension. The steam-cock G′ is quickly closed when the upheaval of the mass of ore is sufficiently effected, and as the steam becomes gradually condensed in vessel E the liquid returns to a common level in A and E. By this action the particles of ore in suspension become graded or classified in order of their size and density, the pyrites, rich auriferous fragments, free gold, and coarse gangue falling down at the relative velocities which they are capable of acquiring. The poor and fine portions remain in the upper layers, while the very fine particles and slimes float on the surface and give up their gold to the amalgamating strips S. The sudden admission of steam is repeated as often as necessary until the ore is finally classified according to size and the slimes freed from gold.

Instead of steam-pressure I may use compressed air or any suitable explosive mixture of hydrocarbon gas and air. The slimes are discharged from the vessel A through the chute L by raising the false bottom B by means of the piston C, actuated by hydraulic power or otherwise, there then only remaining in vessel A matters which may be classified generally as follows: first, fine tailings; second, coarse tailings; third, concentrates. By the continued upward motion of piston C the charge is raised out of the vessel A, the tailings being collected as separate layers by mechanical scrapers, or preferably, as the tailings are sufficiently fluid, by running off through the chute L into gold-dissolving vats, in which the matters are treated according to size and richness. As the concentrates are generally in but small proportion, they are allowed to accumulate to a sufficient depth by repeated operations before being removed. The cover N, carrying the strips S, is of course raised before the removal of the charge from the vat and transported by a crane or other

mechanical means to a table, where the gold amalgam may be scraped off and the strips amalgamated anew or replaced by fresh ones before being returned to the vat.

The vessel A has an outlet M at bottom for removing any ore which may have passed through the perforated false bottom B. Suitable water level and pressure gages may be provided on vessels A and E, as well as valves for the admission of air when required, in order to avoid back pressure. The vessels A and E instead of being side by side, as shown, may be arranged in any other suitable manner with regard to one another.

The operation may be carried out by employing a weak solution of cyanid of potassium or other equivalent salts instead of pure water, especially where the gold is to be precipitated by electrolysis, and in order to facilitate the deposit of the slimes there may be added to the containing liquid agglomerative matters, such as chlorid of calcium, which act mechanically to agglomerate the fine particles of the slimes and so enable their more rapid separation from the auriferous liquor.

I claim—

In an apparatus for simultaneously concentrating, classifying and amalgamating gold ores, the combination of a main tank, a second closed tank communicating with the main tank, a perforated bottom in the main tank for receiving the gold ores in suspension in a liquid body, means for raising and lowering the said bottom and a removable cover for the said main tank provided with depending amalgamated plates, substantially as described and for the purposes set forth.

The foregoing specification of my process and apparatus for simultaneously concentrating, classifying, and amalgamating gold ores signed by me this 19th day of March, 1896.

JULES GARNIER.

Witnesses:

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