(No Model.)

L. M. HOWE & L. A. GATES.

APPARATUS FOR EXTRACTING GOLD AND SILVER FROM ORES.

No. 454,538. Patented June 23, 1891.

Fig. 1.

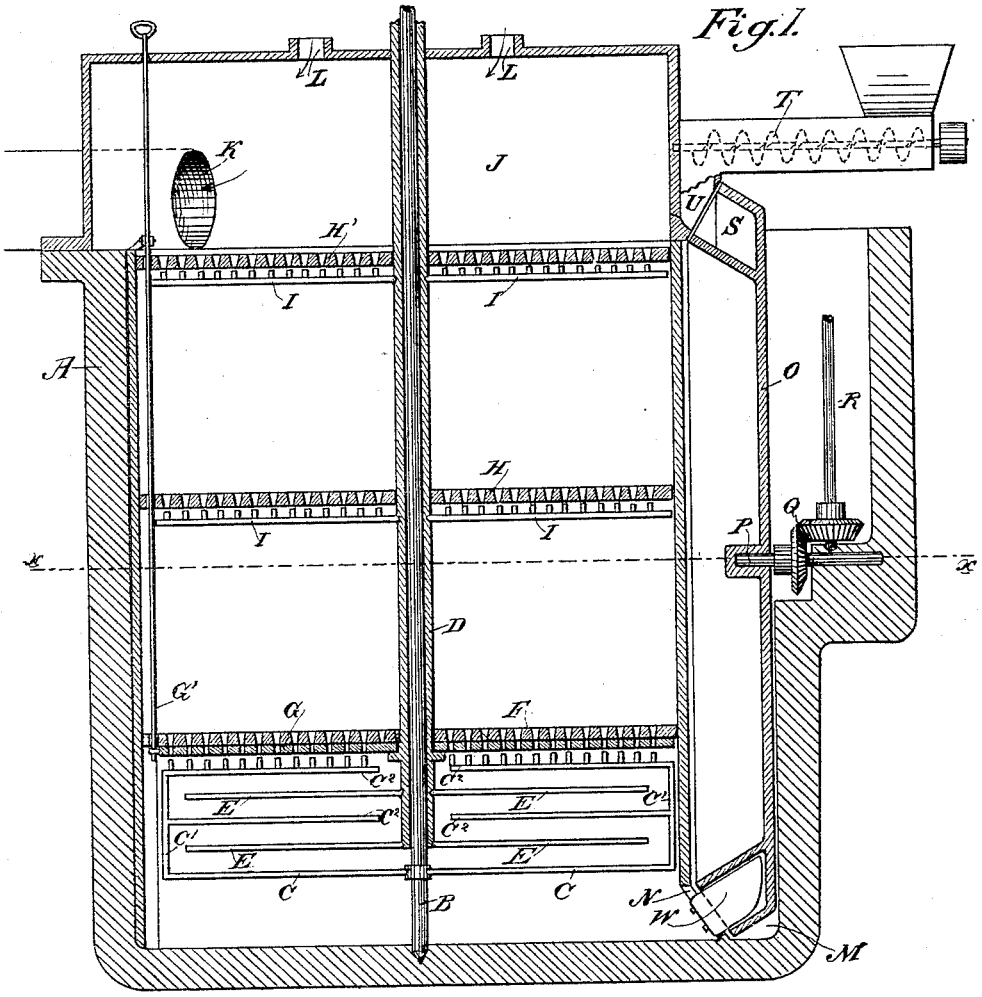
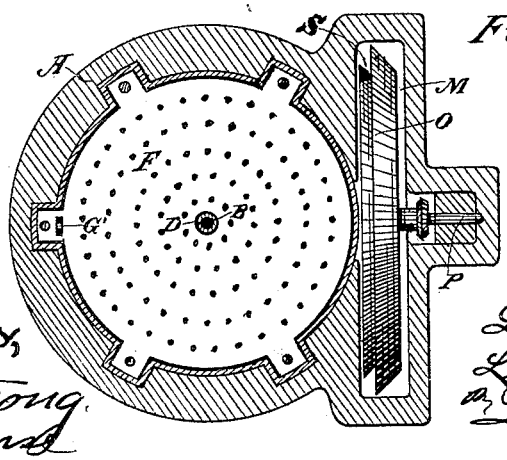


Fig. 2.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR EXTRACTING GOLD AND SILVER FROM ORES.

SPECIFICATION forming part of Letters Patent No. 454,538, dated June 23, 1891.

Application filed April 18, 1890. Serial No. 348,543. (No model.)

To all whom it may concern:

Be it known that we, LOUIS M. HOWE, a citizen of the United States, residing at Greenwood, Eldorado county, State of California, and LEWIS A. GATES, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Apparatus for Extracting Gold and Silver from Ores; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to an apparatus for extracting gold and silver from their ores; and it consists of certain details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section taken through the apparatus. Fig. 2 is a horizontal cross-section on line *x x* of Fig. 1.

A is an exterior chamber, made of brick or any other suitable material, and adapted to contain a melted or liquid metal, which will take up and separate the precious metals from the ore or refuse. Through the center of this chamber from top to bottom extends a vertical shaft B, which has a step in the center of the bottom, and may have any suitable connection at the top by which it can be turned. Upon the lower end of this shaft are fixed the arms C, which project out to near the sides of the casing, then extend upwardly, as shown at C′, and have the inwardly-projecting arms C^2 fixed to them at intervals.

Around the outside of the shaft B is a sleeve D, which also extends down through the top of the apparatus and down to a point just above the arm C, where it has projecting from it the arms E. These arms E project between the arms C^2, and these two sets of arms may be moved in opposite directions, so as to stir and agitate the pulverized ore or material, which is delivered into the bottom of the cylinder and below these stirring-arms.

Above the arms C^2 is fixed a perforated disk F, and beneath this disk is fixed another disk G, having perforations corresponding with those in F. This disk may be turned with relation to the disk F by a rod G′, so as to close or open the holes, the two working with relation to each other like an ordinary circular damper.

At intervals above the disk F are other perforated disks H and H′, situated at equal or any suitable distances from each other and from the disk F, and beneath each of the disks H and H′ are the stirring-arms I, projecting from the sleeve D and operated therefrom.

Above the upper perforated plate H is the chamber J, of considerable dimensions, forming the upper part of the cylinder and having a discharge-opening K leading out to one side.

Passages L, opening into the top of the cylinder, serve to admit a strong blast of heated air, the object of which will be described hereinafter.

Upon one side of the chamber A is formed a circular chamber M, standing in a vertical plane and having its lower portion opening into the bottom of the chamber A by a passage N. Within this vertically-arranged chamber M is journaled a wheel O, standing also in the vertical plane and having the horizontal shaft or axis P, upon which it turns. By means of a beveled gear Q and a shaft R motion may be given to this wheel O. The periphery of this wheel is formed into an inclined chamber S, which extends all the way around, forming a sort of double rim into which the ore is fed by means of a screw or worm T, traveling in a suitable case, which delivers through the passage U into the chamber S on the rim of the wheel O. The rotation of this wheel carries the material down beneath the surface of the liquid metal, which fills the chamber A and also the chamber M, and delivers it through the opening N in the lower part of the chamber A.

In order to discharge the ore from the channel S in the rim of the conveying-wheel, we have fixed an adjustable scraper or mold-board W, something like that of an ordinary plow, so that it will project into the carrying-channel at or near the lowest point, which it reaches by the revolution of the wheel, and this mold-board acts to turn the material out of the channel, where it is partially held up to this time by the pressure of the liquid or melted metal against it, and by this mold-board it is

delivered into the bottom of the chamber A, as before described. This material is usually ore which contains either of the precious materials pulverized to a condition of very fine powder, and by means of the stirrers C′, C², and E it is agitated and caused to gradually rise up through the metal and through the openings in the disks or perforated plates G F, thence rising up through the space to the next disk H it is still agitated by the arms I, and eventually passes through the holes in the plate or disk H, rising again to the perforated disk H′, and being stirred at this point also until the whole of the material has risen up through the openings in the disks and to the surface of the liquid metal within the apparatus, this surface being a short distance above the upper disk H′, as shown at the line which indicates it. At this point, when the ore rises above the surface of the metal, it is subjected to a strong blast of superheated air, which separates any of the liquid metal from the ore and prevents its being carried off with the ore. The fine dust of the ore, which has by this time been separated from the precious metals, will be discharged through the opening K by reason of the blast, and the operation of the apparatus will thus be continuous.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

An apparatus for separating gold and silver from their ores, consisting of a main cylindrical chamber adapted to contain molten metal and having transverse perforated diaphragms fixed within it, a vertical shaft extending through the chamber and provided with radiating arms C, having upturned ends provided with inwardly-projecting arms C², a sleeve surrounding the shaft having the arms E radiating therefrom between the arms C C² and beneath the lower diaphragm, a supplemental perforated diaphragm G beneath the lower fixed diaphragm, a rod G′, connected with the supplemental diaphragm and rotatable so as to open or close the holes in the fixed diaphragm, the arms I, carried by the sleeve D and operating under the fixed diaphragms, a supplemental chamber at one side of the main chamber, and feed mechanism, whereby ore may be delivered from said supplemental chamber into the lower part of the main chamber beneath the perforated diaphragms, substantially as herein described.

In witness whereof we have hereunto set our hands.

LOUIS M. HOWE.
LEWIS A. GATES.

Witnesses:
S. H. NOURSE,
H. C. LEE.