

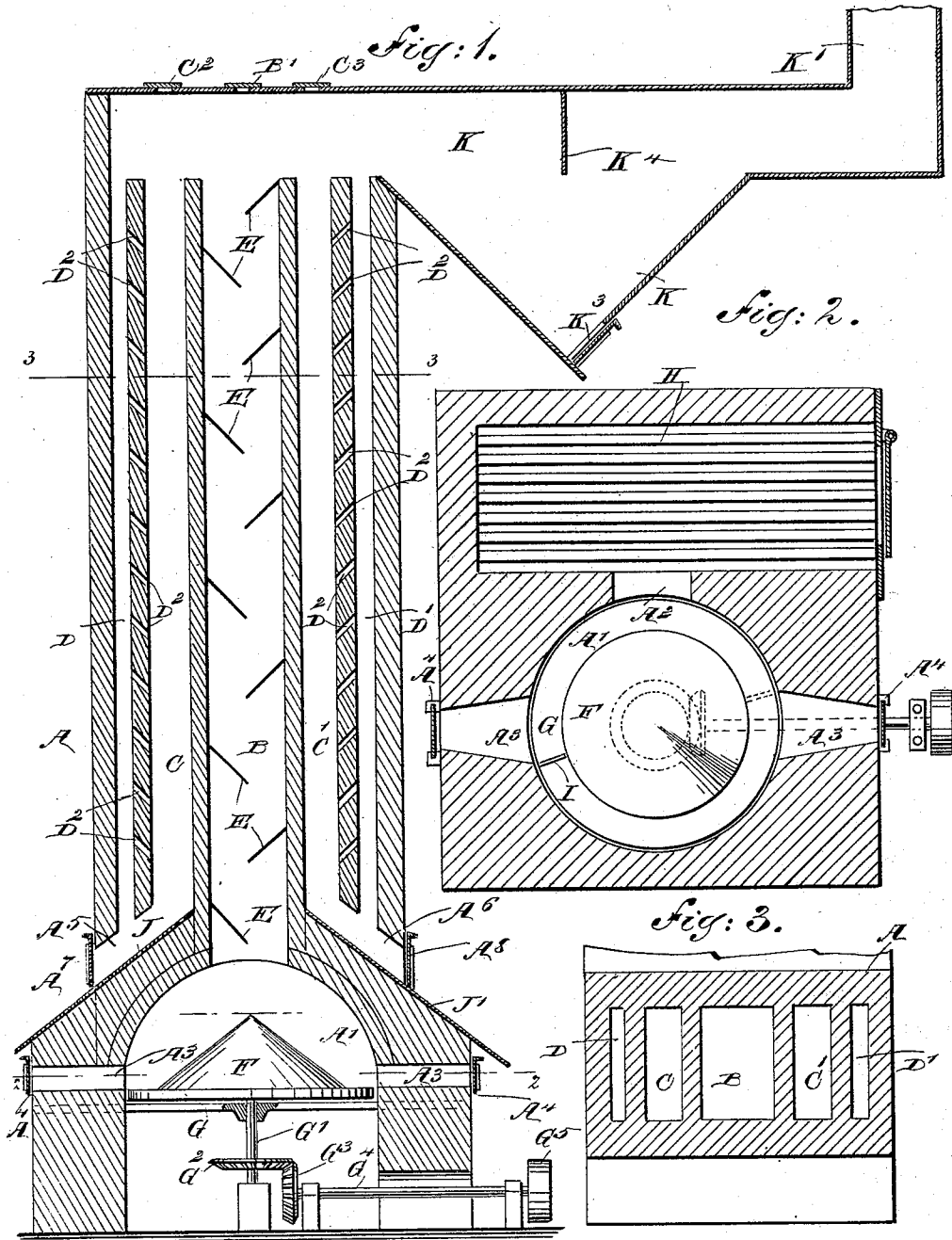
(No Model.)

J. C. GARVIN.

APPARATUS FOR REDUCING GOLD AND SILVER ORES.

No. 539,769.

Patented May 21, 1895.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN C. GARVIN, OF DENVER, COLORADO, ASSIGNOR TO HIMSELF AND
VIRGIL M. CAME, OF SAME PLACE.

APPARATUS FOR REDUCING GOLD AND SILVER ORES.

SPECIFICATION forming part of Letters Patent No. 539,769, dated May 21, 1895.

Application filed July 17, 1894. Serial No. 517,768. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. GARVIN, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and Improved
5 Apparatus for Reducing Gold and Silver Ores, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved apparatus for reducing
10 gold and silver ores in a very simple, rapid and economical manner.

The invention consists in certain parts and details, and combinations of the same, as will be hereinafter fully described and then
15 pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the views.

20 Figure 1 is a sectional side elevation of the improvement. Fig. 2 is a sectional plan view of the same on the line 2 2 of Fig. 1, and Fig 3 is a similar view of the same on the line 3 3 of Fig. 1.

25 The improved apparatus is provided with a stack A, built of suitable fire brick, and formed with an interior central shaft B, along-side of which are arranged the ore drying chambers C and C', connected by upwardly
30 slanting gas escape apertures D² with gas chambers D D' arranged alongside the chambers C C' respectively, as will be readily understood by reference to Figs. 1 and 3. In
35 the central shaft B are arranged on opposite sides, the inclined shelves E, made of tile or other suitable material, and arranged in such a manner that one shelf discharges upon the next lower one, to cause the ore fed
40 into the upper end of the said shaft to drop from one shelf to the other, so as to break the fall of the ore in its downward movement, and also to retard the downward movement of the ore.

The chambers C and C' are used for ore
45 drying purposes, while the shaft B is used for the chloridizing and roasting, and the chambers D D' are used for making sulphuric acid as hereinafter more fully described.

The material is fed into the upper end of
50 the shaft B, through a door B' arranged in the top, and similar doors C² and C³ lead to

the upper ends of the chambers C and C' respectively.

In the exterior stack A, and below the central shaft B, is formed a roasting chamber 55 A', preferably having an arched top under the drying chambers C and C', and in the chamber A' is arranged a hearth in the form of a cone F, centrally under the shaft B, and this cone F is set with its base centrally on
60 and fastened to a disk G mounted to revolve in the chamber A', as plainly shown in the drawings. The material flowing down over the shelves E, finally lands on the cone F, down the face of which it rolls upon the disk 65 G, which latter is continually revolved to completely roast the material under treatment. Into this chamber A' leads an opening A², (see Fig. 2,) connected with the fire box H in which fuel is burned to permit the heat gen- 70 erated to pass through the opening A² into the chamber A', and to ascend through the central shaft B, so as to come in contact with the downwardly moving material.

Upon the top of the disk G extend scrapers 75 I, arranged near outlets A³ formed in the sides of the stack A, so that the disk in rotating carries the material to the said scrapers which causes the material to be pushed into the outlets A³, to be finally discharged to the outside 80 of the furnace. Both openings A³ are adapted to be closed by suitable doors A⁴ held on the outside of the stack A.

The disk G is held on the upper end of a shaft G' mounted to turn in suitable bearings 85 and carrying a bevel gear wheel G², in mesh with a bevel gear wheel G³ secured on a horizontally-extending shaft G⁴ passing through the lower end of the stack A to the outside thereof, to connect by a pulley G⁵ and belt 90 with suitable machinery for imparting a rotary motion to the shaft G⁴, so that the latter by the gear wheels G³ and G² rotates the shaft G' and consequently the disk G and cone F.

At the lower ends of the chambers C, D and C' D' are arranged metallic bottoms or chutes 95 J J' respectively, inclined downwardly and outwardly and passing through outlet openings A⁵ and A⁶ in the sides of the exterior stack A, the said outlets being adapted to be closed by suitable doors A⁷ and A⁸ respectively which when opened, permit the dried 100

material to slide over the bottoms J J' to the outside of the stack A.

The upper ends of the shaft B and chambers C C' and D D' discharge in a horizontally extending flue K leading to the chimney K', and in the bottom of the said flue K near the stack A, is arranged a V-shaped dust chamber K², in which can settle heavy particles carried upward by the rising gases escaping through the flue and chimney K'. A door K³ in this V-shaped dust chamber permits of removing the accumulated particles from time to time. A deflecting plate K⁴ is also arranged in the flue over the dust chamber to deflect heavy particles carried by the gases into the dust chamber.

The operation is as follows: The ore is fed from the crusher into the chambers C and C', where it is both dried and heated, and where it can be partially desulphurized, thus reducing the cost of pulverizing, the heat making the ore more friable. This is done in the furnace by the waste heat without any additional cost. The ore is then pulverized by a suitable machine and screened to the proper fineness, and then mixed with chloride of sodium or salt. The mixed ore is then elevated to the top of the furnace, where it is fed into the hot vertical shaft B, and passes down over the shelves E upon the cone shaped hearth, where it is kept until it is desulphurized, chloridized and roasted, after which it can be leached out by any or all of the solvents, such as hot solution of salt, hypo-sulphite of soda, chlorine water or chlorine gas. Any or all of these solvents may be used for the purpose, together with electricity to insure proper decomposition of the salts and for the generation of chlorine; also for precipitating the metals. The gold and silver may also be obtained separate and pure, likewise copper in case any is contained in the ore, or both the gold and silver can be amalgamated by quick-silver if there is much coarse gold in the ore. It will be seen that the gases arising in the chambers C C' can readily escape through the slanting apertures D² into the gas chambers D D', from which the gases may be carried off for making sulphuric acid, in case heavy sulphide ores are under treatment in the furnace. The apertures are made slanting upward to prevent choking up by the ore passing down the chambers C C'.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent—

1. An ore furnace comprising the imperforate stack having the alternately arranged inclined deflectors discharging zig zag one upon the other, a circular roasting chamber at the lower end of the stack, a fire box having an opening discharging into said chamber and an outlet leading through the wall of the chamber, a rotary circular horizontal hearth within said chamber, an imperforate cone upon said hearth with its apex in line with the center of the shaft and its base of less diameter than the said hearth, a deflector to remove the roasted material from the marginal portion of the hearth and direct it into said outlet, and a horizontal flue into which the upper end of the shaft opens and provided with a feed opening directly over the upper end of the shaft, substantially as described.

2. An ore treating furnace comprising a shaft imperforate throughout and provided with a hearth at its bottom, vertical drying chambers at opposite sides of and independent of said shaft, vertical gas chambers along side the drying chambers and communicating therewith through series of inclined openings, a horizontal flue into which the upper ends of the shaft and drying and gas chambers open, feed openings in the top of the flue over the shaft and drying chambers and outlet or discharge openings into which the lower ends of said drying and gas chambers open substantially as described.

3. An ore furnace comprising the stack A having a central vertical shaft B provided with deflectors E E, the enlarged roasting chamber A' at the bottom of the shaft, a fire box having an opening A² leading into the roasting chamber, a rotary hearth forming the bottom of the roasting chamber, vertical drying chambers alongside the shaft and independent thereof, gas chambers along side of and communicating with the drying chambers, outlets J, J' at the bottoms of the drying and gas chambers, a horizontal flue into which the upper ends of the shaft and drying and gas chambers open and feed openings in the top of the flue over the shaft and drying chambers, substantially as described.

JOHN C. GARVIN.

Witnesses:

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