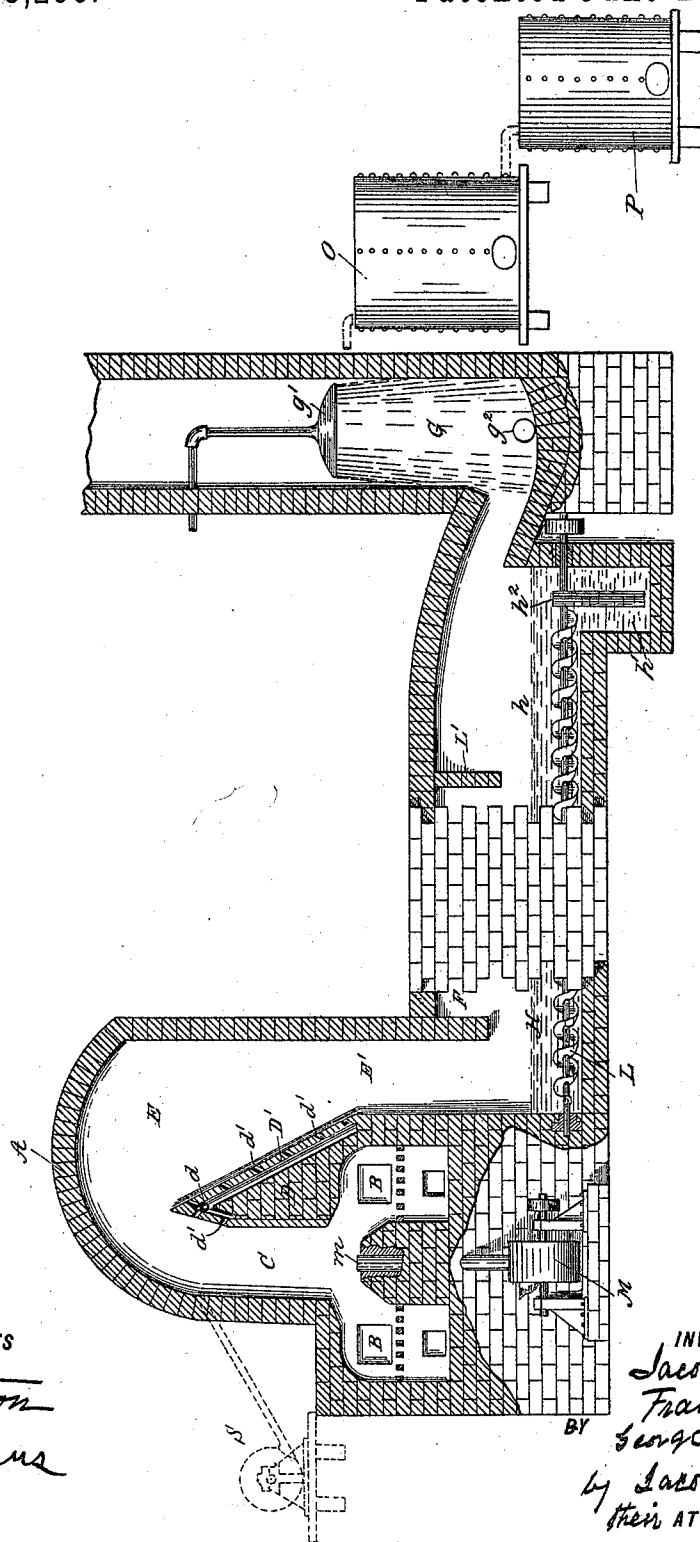


(No Model.)

J. J. STORER, F. MARTIN & G. O. EATON.
CHLORINATION PROCESS OF OBTAINING GOLD FROM ORES.

No. 585,295.

Patented June 29, 1897.



UNITED STATES PATENT OFFICE.

JACOB J. STORER, OF NEW YORK, N. Y., FRANK MARTIN, OF TOWNSEND, MONTANA, AND GEORGE O. EATON, OF NEW YORK, N. Y.; SAID STORER ASSIGNOR TO MARY L. STORER AND SAID EATON ASSIGNOR TO EMMA C. EATON, OF NEW YORK, N. Y.

CHLORINATION PROCESS OF OBTAINING GOLD FROM ORE.

SPECIFICATION forming part of Letters Patent No. 585,295, dated June 29, 1897.

Application filed February 6, 1896. Serial No. 578,276. (No specimens.)

To all whom it may concern:

Be it known that we, JACOB J. STORER, residing at New York, county of New York, State of New York, FRANK MARTIN, residing at Townsend, county of Meagher, State of Montana, and GEORGE O. EATON, residing at New York, county of New York, and State of New York, citizens of the United States, have invented an Improved Process for Obtaining by Chlorination the Gold from any Ore Containing It, of which the following is a specification.

This invention relates to the treatment of ores containing gold; and its object is an improved process for obtaining by chlorination the gold from any ore containing it.

The present methods of treating ores containing gold for the purpose of winning that metal from them are so well known that they require no description herein.

To carry our invention into effect, we reduce the ore by suitable machinery to an exceedingly fine powder, then cause it to be floated on a current of air into and through a suitable highly-heated furnace for the purpose of oxidizing the base elements of the ore, whence the non-volatilizable portion shall fall continuously in separate hot particles directly without arrest or retardation into a bath of water containing free chlorin, chlorid of lime, or chlorid of sodium in solution, and simultaneously and continuously when using the chlorids we introduce sulfur acids or gases into said bath for the purpose of liberating the chlorin from its base or bases, so that it may attack the particles of gold and convert them into a soluble chlorid, and simultaneously and constantly we, by means of suitable mechanism, keep the pulp and liquid in agitation to better expose the gold particles to the action of the solvent, and continuously, by means of suitable mechanism and devices, we cause the pulp and liquid to be conveyed or drawn off into settling-tanks for the deposition therein of the pulp from the liquid and cause said liquid either to be returned from said tanks to the bath to supply loss by evaporation therein and to take up more gold, or, if it be sufficiently auriferously

saturated, cause it to be conducted into a filter of charcoal, by means of which the gold may be precipitated, or to a precipitating-tank in which the gold may be precipitated by iron sulfate, sulfureted hydrogen, or other reagents applied for such purposes.

We have found that by introducing hot minute particles of gold into a water-bath containing nascent chlorin the solution of the gold is facilitated or hastened to an exceedingly-marked degree, so that its complete chlorination by our method is almost instantaneous, while by any of the present methods several hours are consumed in accomplishing this result. Hence it will be seen that by our process great economies in time and labor are made.

The accompanying drawing shows a partly-sectional elevation of an apparatus adapted for carrying out this process.

In the drawing, A represents a furnace constructed with opposite fireplaces B B in the base thereof, whose throats open into a flue which is vertical for a short distance, as shown at C, and then is curved over a partition-wall D and expanded into a large gas mingling and combustion chamber E, and then is contracted and carried perpendicularly down, as shown at E', to communicate with a horizontal flue F, at the farther end of which is a communicating smoke-stack G.

In the partition-wall D is an air-chamber D', into which air may be admitted through an opening *d*, and the inclined faces of said wall are provided with numerous perforations *d'*, communicating with said chamber.

In the bottom of the flue F is a tank H, extending from the furnace-base nearly to the smoke-stack, and this tank is designed to be filled with water up to the dotted line shown at *h*. In the farther end of the tank is a well *h'*, and arranged longitudinally in said tank is a screw conveyer L, and one or more deflecting-walls L' are arranged in said horizontal flue above the tank.

The bottom of the smoke-stack is preferably bowl-shaped, as shown at *g*, and a rose-jet or sprinkler *g'* is fixed in the upper part of said stack.

M represents a suitable machine, such as a fan-blower, for instance, for forcing the finely-pulverized ore which may be fed into it into the furnace on a current of air, or the machine may both pulverize and introduce the ore.

The operation is as follows: The tank is filled with water to the dotted line shown at *h*, and free chlorin, chlorid of lime, or chlorid of sodium is introduced therein. Fires are then made in the fireplaces and urged until the flue portion C is sufficiently hot. Then the finely-pulverized ore is introduced into the machine M and air also admitted therein, and together and intermingled they are forced through the machine-pipe *m* up between the fireplaces axially into the vertical portion of said flue, where the sulfur and other oxidizable elements of the ore ignite. The ascending column of ignited ore as it turns over the partition-wall D is attacked by jets of air issuing from the air-chamber D' through the perforations *d'* on that side, a blower (not shown) furnishing the necessary air through the opening *d*. The ore column then passes into the expanded portion of the flue—the gas mixing and combustion chamber E—and there is supplied with more air from the perforations *d'* on that side, and in this chamber E the gases and air have ample room for expansion, intimate mingling, and complete combustion and for the oxidation of all oxidizable elements, and thence the non-volatile constituents of the ore—*i. e.*, most of the metallic oxids, the earthy matters, and the non-oxidizable metals—fall directly into the water or bath in the tank, while the sulfur and other gases and fumes, together with a small portion of the finest ore-dust, pass onto the smoke-stack, where they are wetted down by water from the sprinkler and fall into the bottom of the stack, whence they may be removed for subsequent use or treatment through a suitable opening *g*².

The deflecting wall or walls L' serve to arrest and deflect a considerable portion of the escaping dust down into the bath in the tank, so that but little passes onto the stack.

If the ore be a pyritic ore and chlorid of lime or sodium be in the bath, the sulfur gases wetted down in the stack may be constantly conducted therefrom into the tank, where, combining with the bases, they form sulfates of lime or sodium, as the case may be, and liberate the chlorin to combine with the gold. If, however, the ore does not contain sufficient sulfur for this purpose of liberating enough chlorin from its base or bases, a suitable quantity of sulfuric acid may be introduced into the tank to effect the desired reactions.

If free chlorin be in solution in the bath, no

sulfurous or other reagent is required to be introduced therein.

As the work progresses the screw conveyer constantly agitates the pulp and solution and pushes the former into the well *h'*, whence it, together with some of the solution, is constantly being removed by a steam-siphon *h*² or other convenient device into a settling-tank O, from which the solution may be conducted to a precipitating-tank P or back to the furnace-tank, as hereinbefore set forth.

The water-level in the tank is constantly maintained by a supply from any available source.

It will be seen that the process is a continuous one and that the fine particles of ore injected into the furnace can lodge nowhere therein excepting in the tank-bath, for the air-jets issuing through the perforations in the inclined faces of the partition-wall prevent any lodgment thereon.

Instead of locating the ore-introducing machine at the base of the furnace, as shown in full lines, and injecting the ore axially up the flue portion C, we may locate it so as to inject the ore at a point higher up, as indicated in dotted lines at S, in which case the ore may be injected diagonally across the upper part of the portion C of the flue directly into the chamber E.

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

The process as herein described of treating gold ores for the purpose of winning the precious metal therefrom, consisting in reducing the ore, by suitable mechanism, to exceedingly fine powder, in then floating it, in separate, independent particles, on a current of air into and through a hot furnace to oxidize the base elements precipitating the hot non-volatile particles continuously, separately and without aggregation, directly into a bath containing free chlorin; in keeping the pulp and liquid in constant agitation to better expose the gold particles to the action of the solvent, and in conducting the liquid containing the soluble chlorid of gold into suitable filters or precipitating-tanks and there precipitating the gold, as set forth.

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