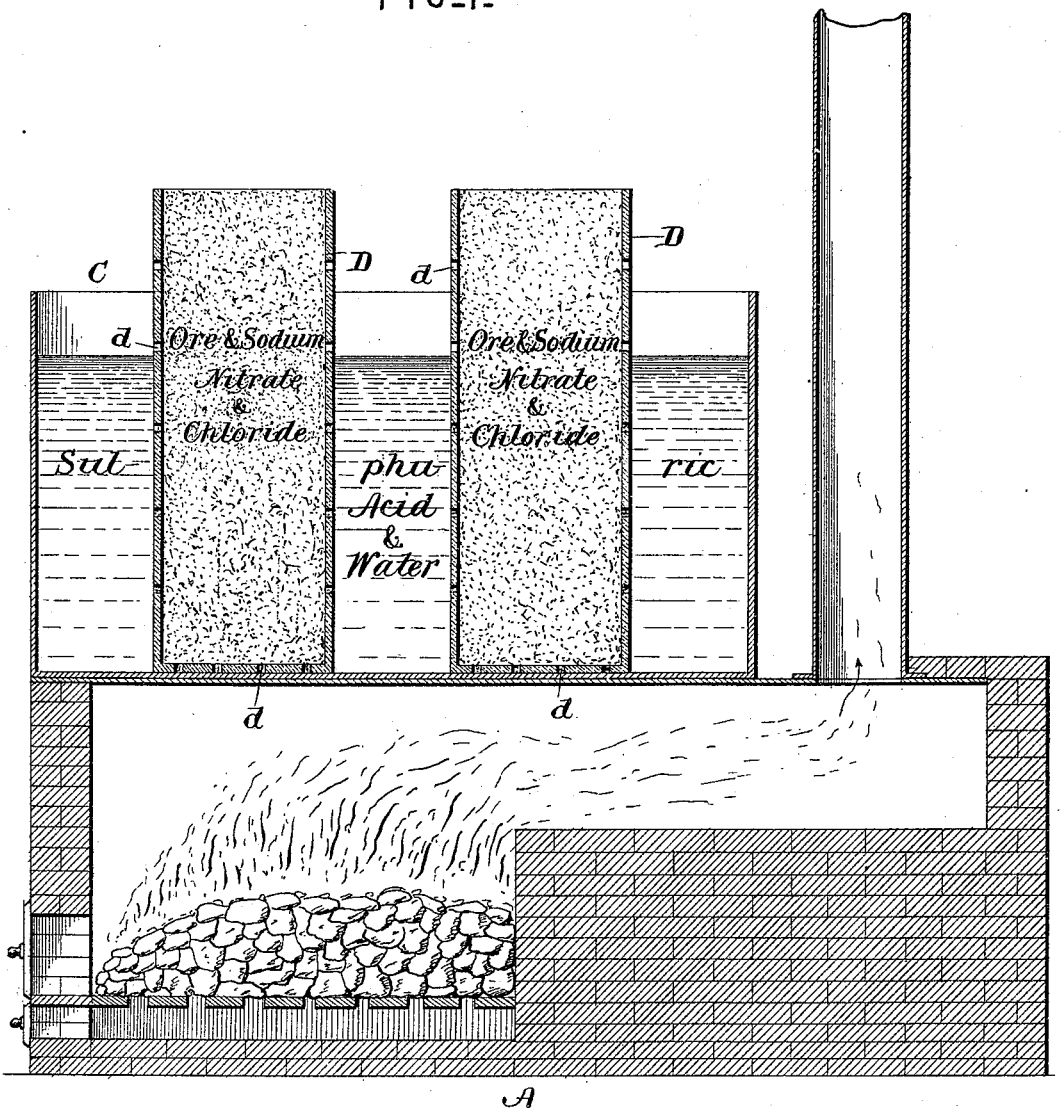
(No Model.) 2 Sheets—Sheet 1.

J. BLAIR.

PROCESS OF RECOVERING GOLD.

No. 492,133. Patented Feb. 21, 1893.

FIG. 1.



Witnesses

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(No Model.) 2 Sheets—Sheet 2.

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No. 492,133. Patented Feb. 21, 1893.

FIG. 2.

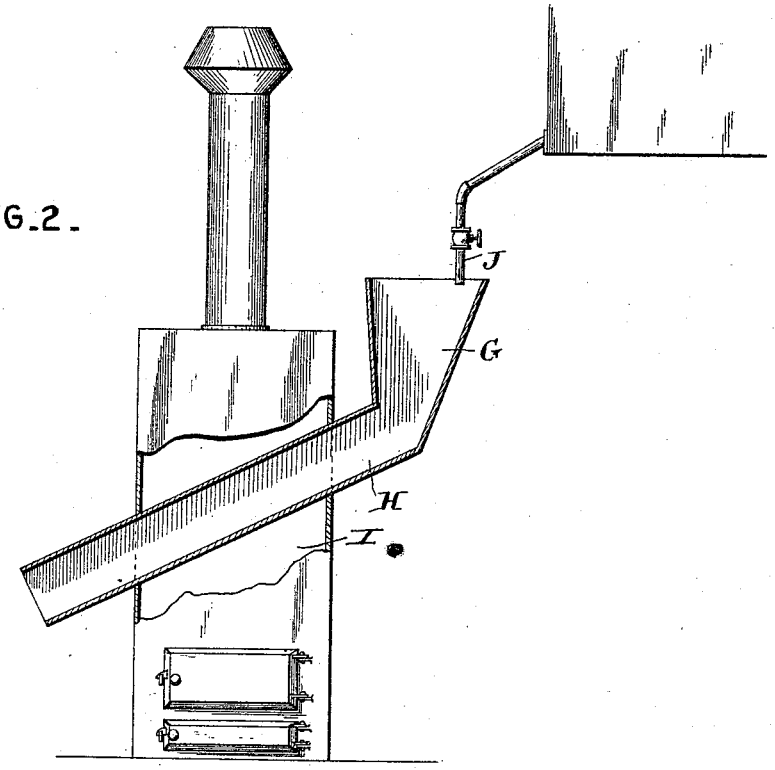
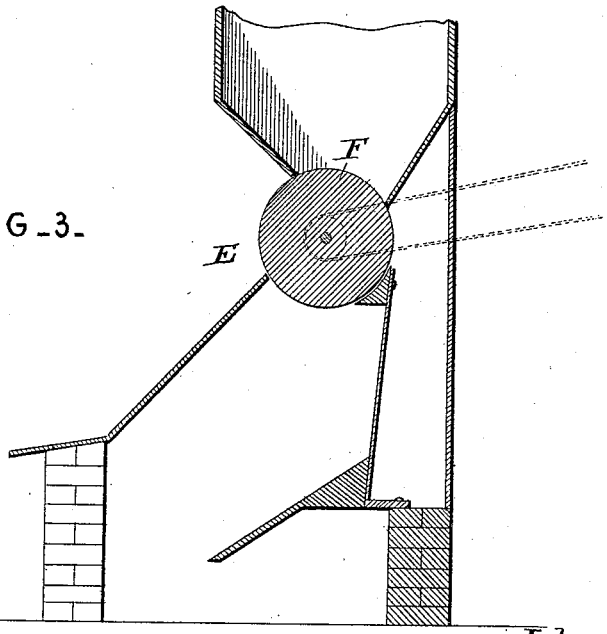


FIG. 3.



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UNITED STATES PATENT OFFICE.

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PROCESS OF RECOVERING GOLD.

SPECIFICATION forming part of Letters Patent No. 492,133, dated February 21, 1893.

Application filed July 19, 1892. Serial No. 440,498. (No model.)

To all whom it may concern:

Be it known that I, JOHN BLAIR, a subject of the Queen of Great Britain, residing at Ardtrea, in the county of Simcoe and Province of Ontario, Canada, have invented a new and useful Process of Recovering Gold, of which the following is a specification.

This invention relates to processes for recovering gold from its ores; and it has for its object to provide an improved process or method whereby gold can be recovered from the black sands of California as well as from any other gold bearing clays and rocks. To this end the invention contemplates a simple and efficient method for recovering gold.

With these and many other objects in view, the invention consists in the process hereinafter described and claimed.

In the accompanying drawings;—Figure 1 is a vertical sectional view of the preferred form of apparatus by which the process is carried out. Fig. 2 is a similar view of a modified form of apparatus. Fig. 3 is a similar view of an ordinary magnetic separator which may be used in conjunction with the process.

Referring to the accompanying drawings;—A represents a suitable furnace upon which is designed to be placed an acid proof vessel or vat C, adapted to receive a solution of sulpuhric acid and water. The acid charge of the vat or vessel is heated until it reaches a temperature of from 150° to 212°, and then the perforated acid-proof ore-jars D are placed within said vat in the acid therein. The said ore jars D are provided with perforated sides and bottoms *d*, through which the acid can percolate, and are designed to receive the sand or other gold bearing clays or rock in a powdered form, cleared of foreign matter in the usual manner. After the ore jars have been filled with the powdered ore as just stated, a mixture, of one part of sodium nitrate and two parts of sodium chloride dissolved in water, is poured over the ore to saturate the same therewith, said solution forming the salt solution for the production of aqua regia, by the union therewith of a suitable acid, as will be understood by those skilled in the art.

It will of course be understood that the vat may be heated by steam or any other suitable means to secure the result aimed for, and in either event, when the jars containing the ore are placed in the acid solution, the said acid solution percolates through the perforated jars into the saturated ore-charge of the same. The heated sulphuric acid combines with the sodium nitrate and chloride, which thoroughly impregnates the ore, to first form aqua-regia to dissolve out the gold present in the ore and produce a soluble salt of gold. In lifting the ore jars out of the acid charge of the vat, a quantity of water is poured therein to carry back all of the soluble salts into the vat. The extra amount of water added to the solution in the vat supplies that lost by evaporation, so that by a continual treatment of the ore jars containing successive portions of ore in the vat the richness of the gold solution in the same is greatly added to, and which solution after a time becomes completely saturated with the gold salts and is then run into another suitable vessel. When the mother liquor has become sufficiently rich in gold salts, the same after being removed from the vat, is treated in a separate vessel with scrap tin or any tin salt, or iron scrap, the gold in the former case being precipitated as purple of Cassius and in the latter case being separated in fine particles of the metal itself, and in either case being easily converted into bar gold by heat.

Now in certain cases it is found necessary in the well known black sands, to first remove the magnetic oxide of iron always present in said sand, and this is necessary in such a case before subjecting the ore to my improved process. In this case I employ a magnetic ore separator E, of the type illustrated in the drawings in which a magnet F is employed to attract the magnetic particles from the sand, which being freed therefrom, is collected and preferably treated in a modified form of apparatus illustrated in Fig. 3 of the drawings. The sand thus separated from the magnetic iron ore is saturated with a solution of equal parts of sodium nitrate and sodium chloride. The saturated sand is then introduced into the hopper G, which leads into the inclined closed chute H, passing transversely through the furnace I. While the saturated sand is

passing through the heated chute, an acid charge of sulphuric acid is run from the spout J, into said hopper and is therefore intermingled with the saturated sand, and undergoing the same re-action as the regular process herein described, dissolves and collects the gold as will be apparent. The gold is recovered in the last mentioned process in the same manner as previously referred to. At this point it may be well to state that the proportions of the chemicals may be varied to suit the exigencies of the case, and further that the by-products of tin and soda will be recovered as metallic tin, and hydrate, or sulphate, of soda respectively. Various forms of apparatus may also be employed to carry out the process described.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A method for separating gold from its ores, which consists in heating successive portions of ore saturated with a solution of sodium nitrate and chloride in a solution of sulphuric acid, and washing the soluble salts formed in each portion back into the acid solution, substantially as set forth.

2. A method for separating gold from its ores which consists in introducing successive portions of ore saturated in a solution of sodium nitrate and chloride and within a perforate vessel, into a vat containing a hot solution of sulphuric acid, and after each introduction of the jars into the vat, washing the soluble salts within said jars back into the solution within the vat, substantially as set forth.

3. A method for separating gold from its ores which consists in first separating magnetic ores from the gold ore, and then heating the ore saturated with a solution of sodium of nitrate and chloride, in a solution of sulphuric acid, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN BLAIR.

Witnesses:
J. W. BLAIR,
J. M. HARVAY.