

UNITED STATES PATENT OFFICE.

EDWARD N. KENT, OF NEW YORK, N. Y.

IMPROVED MODE OF PREPARING ORES.

Specification forming part of Letters Patent No. **45,048**, dated November 15, 1864.

To all whom it may concern:

Be it known that I, EDWARD N. KENT, of the United States Assay Office, in the city, county, and State of New York, have invented a new and useful Improvement in the Preparation of Ores; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to fully understand and use the same.

My invention consists in taking tailings or crushed ore as it comes from the stamps or mills and mixing it with a solution of chloride of sodium or its equivalent in such proportions as to form a stiff paste, and then form or press it into cakes, lumps, or bricks, which, after drying by exposure to the air, are calcined in a common stove, furnace, heap, or kiln constructed so as to have a draft of heated air through the interstices of the cakes, lumps, or bricks in such a manner as to bring the chemical into the most intimate contact with every particle of the crushed ore, and admit of the subsequent calcination in the best and cheapest manner.

I am aware that dry salt has been used for calcination in a reverberatory furnace; but in this case a great deal of manual labor is required at the furnace, and by constant stirring a large amount of dust is lost. The salt and ore cannot be so intimately mixed, the chemical action is less perfect, and the quantity of ore operated upon is limited to the capacity of the furnace, which is very expensive.

I am also aware that water has been used for making a paste of certain ores with lime or clay for smelting; but I am not aware that salt and water together, or a solution of salt, has been before used for the purposes herein specified.

By the use of a solution of salt and by caking the ore a common stove, furnace, or kiln, such as is used for burning lime or bricks, may be used for the calcination of crushed ores or tailings; or the caked ore may be calcined in heaps. No manual labor or stirring is required during the calcination, and consequently no dust is lost. The mixture of the salt and ore is perfect, and the quantity operated upon may be almost unlimited, as in a lime kiln the process of calcination is continuous, and a brick-kiln of ordinary dimensions containing five hundred thousand bricks of five pounds each

would equal one thousand two hundred and fifty tons of ore to be calcined at one operation. It is estimated that one cord of wood is sufficient fuel for two thousand bricks or five tons of ore, and that ten thousand bricks or twenty-five tons of ore can be prepared with one machine per day.

Ore prepared in this manner is not only desulphurized in the best manner without the trouble and expense of building reverberatory furnaces, and the loss of dust by constant stirring or violent agitation in a current of air, but it contains all the metals, except gold, in the condition of chlorides, and when these are dissolved or decomposed the gold, if any is present, is left clear and bright and in the best possible condition for amalgamation.

Arsenic, zinc, and antimony are the most troublesome metals in ores submitted to amalgamation; but by this process of preparing the ore these metals are removed as volatile and soluble chlorides during the calcination and subsequent amalgamation, and when the last operation is performed in close vessels, or by the barrel process, with metallic iron and mercury the chloride of silver is reduced to metallic silver and saved, and more gold may thus be obtained than by any other process of amalgamation; but by any process of amalgamation more gold can be obtained from the prepared ore than from crude ore or roasted ore when calcined or roasted alone.

By washing pyritic ores prepared by this process an acid solution of nickel, copper, zinc, or iron, according to the nature of the ore, together with sulphate of soda and other salts, is obtained, from which the metals may be precipitated by soda, lime, iron, sulphureted hydrogen or sulphide of sodium; or the solution may be evaporated at once to dryness, and from the chlorides thus obtained the metals, or any other compound of the metals, may be prepared without difficulty and with less expense than by the use of acids.

After amalgamating or washing the prepared ore the tailings may be concentrated to one or two per cent. of its former weight, and, if desirable, this may be smelted for nickel "matte," or metallic lead, if these metals are present; but I prefer to dress or concentrate the tailings in such a manner as to leave about one-fourth (more or less) of the original weight of

the ore, and, after draining the concentrated residue or dressed ore, to mix this with sufficient crude ore and solution of salt to make the original quantity, and calcine, wash, or amalgamate as before, and so on continuously. In this way the valuable metals and the impurities in the native ores are gradually separated, and the concentrated residue becoming constantly richer at every subsequent concentration, the quantity of gold which may be obtained by close amalgamation from ores prepared by this process averages from seventy-five per cent. to the full assay value of the ore.

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

1. The preparation of crushed or pulverized ores and tailings by caking them with a solu-

tion of chloride of sodium, or salt and water, introduced in any manner, so as to admit of forming the crushed ore into cakes, lumps, or bricks, as specified.

2. The calcination of crushed ores and tailings in a common stove, furnace, heap, or kiln, when previously prepared by the use of a solution of chloride of sodium, or salt and water, and made into lumps of any form, so as to admit of the decomposition of the salt by the passage of a current of heated air through the interstices of the lumps so formed, substantially as herein described.

EDWARD N. KENT.

Witnesses:

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