

UNITED STATES PATENT OFFICE.

FREDERICK HOLLICK, OF NEW YORK, ASSIGNOR OF ONE-HALF TO J. J. GREENOUGH, OF SYRACUSE, N. Y.

AMALGAMATING ORES.

SPECIFICATION forming part of Letters Patent No. 314,578, dated March 31, 1885.

Application filed October 20, 18 2. (No specimens)

To all whom it may concern:

Be it known that I, FREDERICK HOLLICK, of the city, county, and State of New York, United States, have invented certain new and
5 useful Improvements in Amalgamating and Agglomerating Gold and Silver, and in separating them from their ores, slums, and tailings, of which the following is a description.

The object of my invention is to facilitate
10 the amalgamation of the precious metals, and to cause their particles and the particles of amalgam formed with them to more readily separate from their ores, slums, and tailings, and agglomerate or cohere together into one
15 mass, instead of remaining in separate minute scales or globules which will not combine, but pass off in the washings, as in the case of what is called "sick gold" or "sick amalgam" in ordinary amalgamation with mercury alone,
20 such failure to cohere or agglomerate causing much waste of the precious metals.

In place of mercury alone I use an easily-fusible alloy composed of five parts of lead, three parts of tin, and eight parts of bismuth,
25 with one part of mercury. This alloy I introduce into any suitable amalgamating-vessel, such as are in ordinary use, along with the ores, slums, or tailings, and then apply sufficient heat to cause the alloy to liquefy, after
30 which the process of working is the same as in ordinary amalgamation with mercury. The heat may be either applied directly by means of a furnace or flue under the amalgamating-pan, or by steam, hot water, hot air, or heated
35 gas of any kind applied in any well-known manner; also by means of melted fat, hot oil, melted resin or paraffine, or heated kerosene, benzine, or naphtha, these agents being used both to cause liquefaction and to modify or
40 prevent oxidation. For example, I take a quantity of pulverized ore and add to it the proper amount of alloy necessary to amalgamate with the gold or silver present, and then cover the whole mass in an amalgamating-pan
45 with kerosene or other hydrocarbon, as described, and proceed to heat it to the proper fluidity, and then grind and mix it, the hydrocarbon protecting the alloy from oxidation during the process. The alloy may therefore
50 be brought to any degree of fluidity which

may be desired, from a simply soft pasty state to perfect liquefaction, by simply raising or lowering the temperature of the heating medium; but it must always be fluid enough to allow of working in the amalgamating-pan in
55 the usual way. This facility for varying the consistence or degree of fluidity of the amalgamating medium is especially valuable in the case of certain ores, slums, tailings, and waste amalgams, in which the metallic particles are
60 in the form of minute scales or globules, which are so fluid and mobile and so coated with some repellent medium that they will not cohere or agglomerate, as in the case of what is called "sick" gold or amalgam. In such
65 ores, slums, and tailings the minute scales or globules of metal or amalgam will not unite with ordinary fluid mercury, but always remain separate and float away in the washings and are lost. By working them, however, with
70 this alloy in a less fluid state, they can be all agglomerated or made to cohere into one mass, and can then be saved instead of being lost, as they are in ordinary amalgamation. If desired, the alloy, with the metals it is amalgamated with, can be made solid or semi-solid for
75 more easily removing by simply lowering the temperature of the heating medium, and be again liquefied, if needed, by again raising the temperature.

To the water or other heating medium I
80 propose to add nitrate or chloride of mercury, nitrate of lead, permanganate of potash, borate of soda, bisulphide of carbon, binoxide of hydrogen, acetate of lead, or nitrate or
85 muriate of iron, in such quantities and proportions as may be found best, according to the varying qualities of the ores, slums, and tailings to be treated. Thus, when the precious
90 metals are coated with sulphur, I use bisulphide of carbon, which dissolves the sulphur, and leaves the metal clean and bright; and when the mercury does not readily unite with the gold or silver I use nitrate of mercury or
95 nitrate of lead, which facilitates the union. When the precious metals have been fully incorporated or amalgamated with the alloy, they can be separated from it as they are now from mercury amalgam by the same process.

The above-named proportions of the con- 100

stituents of the alloy may be varied according to variations in the composition of the ores, slums, or tailings to be treated. Thus, when they contain much lead, less may be used in the alloy, and the same with the bismuth, tin, or mercury. The heating mediums above described may also be either used separately or combined together in any proportions which may be found best, according to the character of the material to be acted upon. In like manner the different chemical substances which may be added to the heating medium—such as the nitrate of lead or nitrate of mercury, &c.—may be similarly used, either singly in some cases, or combined in any desired proportions and quantities.

Having thus described my improvements in amalgamating and agglomerating the precious metals and separating them from their ores, I claim—

1. The process of amalgamating ores, slums, and tailings of the precious metals by means

of an alloy of lead, tin, bismuth, zinc, and mercury so proportioned as to melt at a low temperature, and employing the same in a melted state as a substitute for mercury, as herein specified.

2. The process which consists in amalgamating ores, &c., with an alloy melting at a low temperature, as described, and maintaining the alloy in a state of fluidity applicable to the free amalgamation of the metals contained in the ores worked, by the application of heat and regulating the same, as specified.

3. In the process of amalgamating ores by the described compound, with the application of heat, as herein specified, the application of hydrocarbons, as described, to prevent the oxidation.

F. HOLLICK.

Witnesses:

JOHN F. SUFFIELD,

ROBT. H. PATTEN TIGHE.