

IMPROVEMENTS IN, OR RELATING TO, THE TREATMENT OF ORES.

I, Henry Livingstone Sulman, of London, in England, analytical chemist, do hereby declare the nature of my invention for "Improvements in, or relating to, the Treatment of Ores," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

During the preparation of ores, whether gold-bearing or of silver, lead, tin or other metals, varying quantities of very finely-divided material are produced by the action of the stamps, rolls, or other apparatus used in crushing such ores, which, owing to the extreme fineness of the grains or particles composing them, are frequently impermeable, or permeable only with difficulty by liquids, and are therefore unsuitable to treatment by aqueous solutions or leaching. These finely-divided products are technically known as "slimes."

In the case of gold- and silver-ore slimes, these being unleachable by solutions of potassic cyanide, soda hyposulphite, chlorine, and other solvents for precious metals, or leachable only with extreme difficulty, these products are not only of no practical value, notwithstanding their containing gold or silver, but the means taken to avoid their formation,—viz., by avoiding as far as possible fine crushing of the original ores tends to create other difficulties, for instance, the imprisoning of fine particles of gold or silver in the imperfectly crushed ore.

In a great many instances, therefore, the present methods of crushing are merely a compromise between these two causes of loss, both of which would however disappear completely if the slimes in whatever quantities produced could be readily leached with suitable solvents.

This I effect by using in connection with the moist or wetted slimes a combination of agents capable of producing a coagulum in greater or lesser quantities throughout the entire mass. I have found by these means that a slime totally impermeable to water has thus been rendered readily leachable by the desired solvent.

The agents I employ are such as give a good coagulum insoluble in the solvent with which it is desired to leach the slime, subsequently such as treatment of the slime first with a solution of gelatine, and then with one of tannic acid or a metallic salt such as precipitates the gelatine with formation of a coagulum.

Some of these coagulums are more suitable for such purposes than others, and for the specific purpose of leaching gold-ore slimes I have found that the coagulum obtained by precipitating ordinary soap by lime, or other suitable precipitant, gives excellent results; and a quite impermeable slime becomes readily permeable, and can be percolated by water or aqueous solvents when heated first with a solution of about 5lb. to 10lb. of soap in water to 1 ton of slimes (reckoning the latter upon the dry material), followed by a thorough admixture of 2lb. to 3lb. of quicklime made into a milk or cream, with water.

If desired, the slimes may first be treated with the cyanide of potassium or other suitable solution, and when the action of this solvent for the gold is judged to be complete the soap-solvent may be mixed with the mass, followed by the admixture of the milk of lime, and the whole mass may then be discharged into suitable leaching-tanks or filters, when the gold- or silver-bearing solution will readily filter off, and the last traces of this liquid can be removed from the now depleted slime by percolation with water.

I do not confine myself to any particular coagulum, or to the treatment of any particular slime, the above-given example showing merely how I proceed in the case of an unleachable gold- or silver-ore slime; but I may vary the nature, quantities, and proportions of the coagulating agents I employ according to the requirements of the ore slime under treatment.

The above method of treatment applies also to slimes of finely-divided deposits obtained from hydraulic workings of alluvial or similar ores.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is,—

1. The above method of treating slimes or analogous deposits so as to render them permeable by the formation of a coagulum substantially as described.
2. The employment in the treatment of slimes and analogous deposits of soap with a precipitant substantially as described.

Dated this 24th day of May, 1894.

HENRY LIVINGSTONE SULMAN.

IMPROVEMENTS IN PRECIPITATING PRECIOUS METALS FROM CYANIDE OR SIMILAR SOLUTIONS.

I, John Stewart MacArthur, of 12, Knowe Terrace, Pollokshields, in the County of Renfrew, North Britain, technical chemist, do hereby declare the nature of my invention for "Improvements in Precipitating Precious Metals from Cyanide or Similar Solutions," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My said invention has for its object to obtain increased economy in precipitating precious metals from cyanide or similar solutions, and to obviate injurious or impeding actions due to the presence of certain metals in the solution.

In carrying out my invention I employ either zinc or aluminium as the precipitant for the precious metals; but when copper is present in the solution along with gold or silver, or both, it is precipitated first on the zinc or aluminium in a manner to interfere with the precipitation of the other metals. The copper seems to be precipitated on the zinc or aluminium in a dense continuous form, and greatly impedes the contact between the liquid and the zinc or aluminium. To overcome this difficulty I coat the zinc or aluminium with a porous precipitate of metallic lead, which prevents the impeding action of the copper. The porous lead may be deposited on the zinc or aluminium either before or during the precipitation of the other metals. It may be conveniently done by immersing the zinc or aluminium for about a minute in a solution containing about 1 per cent. of lead as an acetate of lead, or as a plumbate or other suitable salt; or if done during the precipitation of the other metals a small quantity of the lead salt is added to the solution.