

UNITED STATES PATENT OFFICE

FREDERICK LAIST, OF BUTTE, MONTANA.

COPPER-LEACHING PROCESS.

No. 903,732.

Specification of Letters Patent.

Patented Nov. 10, 1908.

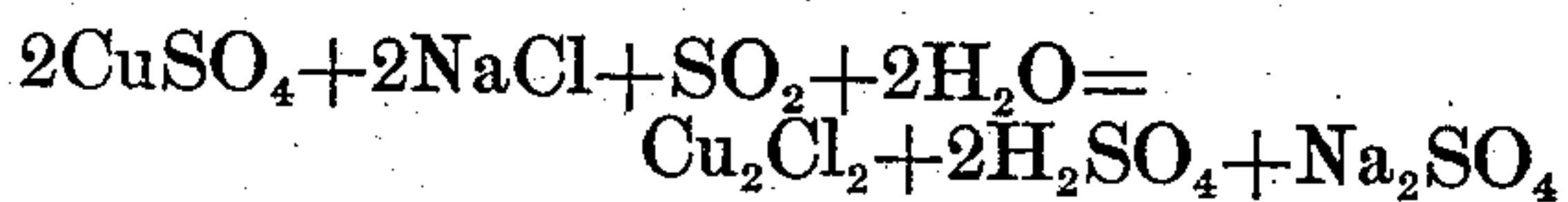
Application filed April 16, 1908. Serial No. 427,306.

To all whom it may concern:

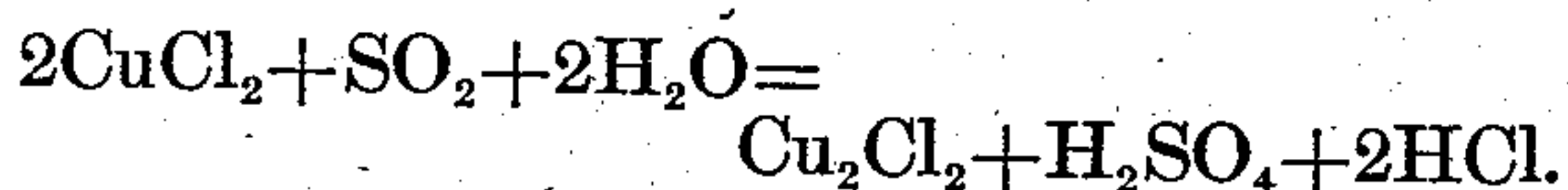
Be it known that I, FREDERICK LAIST, a citizen of the United States, residing at Butte, in the county of Silverbow and State of Montana, have invented a new and useful Improvement in Copper-Leaching Processes, of which the following is a specification.

The process relates to the leaching of oxidized copper ores with a dilute solution of sulfuric acid which contains chlorine in the form of a chlorid of some sort, (such as sodium chlorid, ferrous chlorid or calcium chlorid), in quantity sufficient to form the sub-chlorid with the copper which goes into the solution and it consists in the novel mode of procedure hereinafter described.

Having dissolved the copper from the ore, it is to be precipitated from the resultant solution as the sub-chlorid, or cuprous chlorid, (Cu_2Cl_2). This is done preferably by running the cold solution down an absorbent tower up which sulfur dioxide gases, (generated by burning pyrites, sulfur, etc.,) are passing. The sulfur dioxide is absorbed by the cold solution, so that I obtain a solution containing 2% to 4% of sulfur dioxide. The percentage of sulfur dioxide gas absorbed must be at least one half of the percent. of copper which the solution contains. This solution is now run into a boiler, lined with an acid proof metal, and containing steam coils for heating and a safety valve adjusted to go off at about 15 lbs. pressure. Here it is brought to boiling and the following reaction takes place.



or more simply stated



The cuprous chlorid being insoluble separates out, especially on cooling the solution, as a white crystalline powder which is collected and dried and which can readily be converted into metallic copper. The solution, which contains a large amount of regenerated acid, is used for leaching fresh quantities of ore.

I am aware that the reactions of this process have been already described in patents heretofore granted to Sterry Hunt and James Douglas, the process being known later as the Hunt and Douglas process. My invention is distinguished therefrom by the improved method of working, which consists in absorbing the sulfur dioxide in the cold copper solution and then heating under pressure to complete the reaction between the sulfur dioxide and the cupric chlorid. The method they pursued was to inject sulfur dioxide into the hot copper solution. This method is not nearly so economical of sulfur dioxide nor so convenient of manipulation as my method. Moreover the sulfur dioxide obtained in practice always contains some oxygen. Hence an oxidation of the precipitated cuprous chlorid always accompanies the reduction of the cupric chlorid which makes it impossible to obtain a complete conversion of the copper into cuprous chlorid. In my method this does not take place, since the oxygen comes in contact only with the cold solution and before the formation of cuprous chlorid has properly started.

Heating under pressure, very materially aids the reduction, because it keeps the sulfur dioxide in the solution until the reaction temperature, (which is near 100°C.) is reached. It is very difficult to obtain a precipitation of more than 75% of the copper in the solution when heating in the open. Under pressure, 90% to 95% can be brought down. In fact the completeness of precipitation is limited only by the slight solubility of cuprous chlorid.

I claim

The process of precipitating copper from a chloridized solution as the sub-chlorid, which consists in first dissolving in the cold solution a quantity of sulfur dioxide, and then heating this solution, under pressure, to complete the reduction of the cupric chlorid to cuprous chlorid.

FREDERICK LAIST.

Witnesses:

JAMES E. MURRAY,
HOWARD K. WELCH.