

UNITED STATES PATENT OFFICE.

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PROCESS OF TREATING COMPLEX SULFID ORES.

No. 914,730.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE E. KINGSLEY, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented a certain new and useful Improved Process for Treating Complex Sulfid Ores, of which the following is the specification.

My invention relates to an improved process for treating complex sulfid ores, such as ores containing galena, zinc, pyrites, etc. It is also applicable to galena ores, which do not carry sulfids.

My process consists in treating the ores with a dilute solution of nitric acid heated to one hundred and seventy-six degrees Fahr. or thereabout. The strength of the solution is from six to seven degrees Baumé or thereabout, which is equal to nearly six and one-quarter or seven and one-quarter per cent. of nitric acid.

I am aware it is not new in treating galena bearing ores with nitric acid for the purpose of effecting the solution of the lead. Hitherto these processes have been unsuccessful on account of the formation of the lead, which is insoluble, and which will always be formed if the strength of the acid used is greater than seven and one-quarter per cent.

By the use of acid of from six and one-quarter to seven and one-quarter per cent. the formation of sulfate of lead is entirely prevented and consequently complete extraction of the lead can be effected, such lead being recovered as solution of lead nitrate.

It is essential in the operation of my process that the solution be heated to one hundred and seventy-six degrees Fahr. in order that the oxids of nitrogen be liberated and free sulfur deposited. The variation in the degree of heat must be very slight indeed, and I find in practice the variation of more than one-half degree will affect deleteriously the action of the dilute nitric acid.

Any convenient form of closed solution tank may be employed, such tank being fitted with a filter bottom and if desired means can be provided for agitation.

After the galena has been dissolved by the nitric acid the metal can be recovered from the solution by an apparatus suitable to the form in which it is desired to obtain the same. The oxids of nitrogen can be reconverted to nitric acid by well known means. The solutions of nitric acid can then be treated for the recovery of lead contents by precipitating the lead in the form of lead chromate a high grade pigment. Lead also may be recovered in the metallic form by well known means. Other metals such as zinc, iron, copper and silver, if present in the ore, will be dissolved with the lead and can be separated and recovered by well known means of precipitation.

In practice I have found that the strength of the solution of nitric acid as well as the degree of heat are essential so much so indeed, that unless practically the exact strength and heat are followed in carrying out my process the result, which I desire to obtain, cannot be effected, and I, therefore, lay emphasis on this fact.

What I claim as my invention is:

In the treatment of complex ores such as ores containing galena, zinc and antimony, immersing the ores in a dilute solution of nitric acid of a strength from six and one-quarter to seven and one-quarter per cent., and heated to one hundred and seventy-six degrees Fahr. as and for the purpose specified.

GEORGE EDWARD KINGSLEY.

Witnesses:

B. BOYD,
R. COBAIN.