

liquor from this third tank is conveyed to the fourth of the series, which is fitted with a revolving stirring-gear having long rods of metallic zinc whereby the whole of the copper is precipitated.

The liquor is then removed to the fifth tank in the series, where it is oxidized by any suitable means until the ferrous iron is converted into ferric iron, when it is treated with a solution of caustic soda, and boiled. By this means the whole of the remaining metallic chlorides are decomposed into hydroxides, and the sodium-chloride regenerated. The liquor, which still contains zinc and manganese, is aerated, and thereby the manganese is thrown down as manganese-dioxide, which can be used in the production of chlorine. The liquor is then removed to a sixth tank, wherein the whole of the zinc, in the form of zinc-sulphide, is precipitated by means of sodic sulphide, or recovered by any well-known means.

This sodium-sulphide has been obtained by heating with carbon the salt-cake or sodium-sulphate resulting from the regeneration of the HCl in the cylinders R, as before described.

The zinc-sulphide may, if desired, be converted into zinc-oxide for use in any zinc electrolyzing tank in order to maintain the strength of the solution and to keep it neutral.

The liquor in the final tank, now only an alkaline brine, is raised by any suitable means into a brine-tank K, placed at the top of a tower L, for the production of sodium-chloride and aqueous HCl, as hereinbefore described.

In my invention as detailed herein there are, as will be perceived, three distinct circulations: Firstly, the circulation of the aqueous HCl through the series of digesters containing raw sulphide ore, and its return to the first of the series of crucibles in the form of saturated solution of lead- and zinc-chlorides for the fusion of the silver-chloride in the ore. Secondly, the circulation of the gaseous HCl through the several digesters containing crude ore until it has become neutralised, and the H_2S resulting from its action on the sulphides in the ore has after use as fuel been returned as SO_2 , which by the use of sodium-chloride has been returned to the tanks as HCl, both in a gaseous and aqueous form. Thirdly, the circulation of the sodium-chloride, comprising, first, its use in generators for the production of gaseous HCl, then in the lixiviating-tanks in the form of sodium-sulphate and caustic soda for precipitation purposes, its subsequent regeneration as sodium-chloride, and final recovery in the aqueous HCl towers for fresh use in the gaseous HCl generators.

In the above description the process is detailed as relating to zinciferous sulphide ores. In the treatment of galena and argentiferous galena, zinc-chloride is first fused in the crucible, and the raw ore in a finely-divided state, either alone, but preferably mixed with lead-sulphate and lead-oxide, poured therein. The lead in the ore is reduced, and sinks to the bottom of the crucible as metallic lead, whereas the gangue, with adhering silver-chloride, rises, and becomes admixed with the fused chloride of zinc. The fused mass is then removed for the recovery of the silver and zinc, in the manner hereinbefore described, and the lead poured off into suitable cakes.

I am well aware that the various parts of my process, either singly or in certain combinations, are well known, and wish it to be well understood that I do not claim as my invention any one of them singly or specifically, or any two or more of them together in any combination whatever except in the particular combinations indicated.

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. In the treatment of argentiferous sulphide ores, the within-described process, consisting of their disintegration by the combined action of aqueous and gaseous hydrochloric acid (HCl), at the same time causing the aqueous hydrochloric acid (HCl) to circulate through fresh supplies of raw ore until it has become a saturated solution of lead and zinc metallic chlorides, subsequently returning such solution to the wholly or partly disintegrated ore, and fusing by heat the whole of the chlorides in the disintegrated mass.

2. In the treatment of argentiferous sulphide ores in which the ore has been wholly or partially disintegrated by the combined action of aqueous and gaseous hydrochloric acid (HCl), the separation of the undecomposed ore for further treatment by fusing the whole of the chlorides produced in such disintegration, such fusion resulting in the admixture of the gangue with the fused mass, and the settling of the undecomposed ore to the bottom of the crucible.

3. In the treatment of argentiferous sulphide ore in which the chlorides formed by the disintegration of the ore by the action of hydrochloric acid (HCl) have been fused, as set forth in claim No. 1, the subsequent process for the recovery of the metallic contents of the fused mass, consisting in the application of aqueous vapour and sulphur-dioxide (SO_2), whereby the metallic contents are obtained as an aqueous chloride solution; subsequently boiling the same in water acidulated with hydrochloric acid (HCl); and finally precipitating the metals therefrom by any known process in suitable precipitating-tanks.

4. In the treatment of argentiferous sulphide ores, the within-described process, consisting of the production of sulphuretted hydrogen (H_2S) by the action of gaseous hydrochloric acid (HCl) upon the sulphides of the ore under treatment, the subsequent utilisation of the aqueous vapour accompanying the sulphur-dioxide (SO_2) resulting from the combustion of the sulphuretted hydrogen (H_2S) for the purposes of dissolving in a suitable drying-chamber the fused chlorides obtained in the manner as set forth in claim No. 1.

5. In the treatment of argentiferous sulphide ores, the within-described process, consisting of the production of sulphuretted hydrogen (H_2S) by the action of the gaseous hydrochloric acid (HCl) upon the sulphides of the ore under treatment, the use of the sulphuretted hydrogen (H_2S) so obtained as fuel, and the subsequent utilisation of the sulphur-dioxide (SO_2) resulting from the combustion of the same for the treatment of sodium-chloride in the production of fresh supplies of gaseous hydrochloric acid (HCl) for use in the disintegration of ore.

6. In the treatment of argentiferous sulphide ores, the within-described process, consisting of the obtaining of sulphur-dioxide (SO_2) by the combustion of sulphuretted hydrogen (H_2S) resulting from the action of gaseous hydrochloric acid (HCl) upon the sulphides of the ore under treat-