ment, the subsequent treatment of sodium-chloride by the sulphur-dioxide (SO_2) so obtained for the production of gaseous hydrochloric acid (HCl), subsequently treating with the gaseous hydrochloric acid (HCl) so obtained salt brine taken from the last of the series of lixiviating-tanks, whereby aqueous hydrochloric acid (HCl) is obtained, and sodium-chloride recovered for renewed use during the process.

7. In the treatment of galena and argentiferous galena, the within-described process, consisting of pouring the raw ore in a finely-divided state, either alone, but preferably mixed with lead-sulphate and lead-oxide, into a bath of fused zinc-chloride, whereby the lead is thrown down as metallic lead, and the silver-chloride, with the gangue, becomes admixed with the fused chloride of zinc, the fused mass being subsequently removed for the recovery of the silver and zinc in the manner hereinbefore described.

Dated this 24th day of June, 1896.

W. E. Hughes,
Agent for the Applicant.

A Process for extracting Precious Metals from Refractory Ores by Means of Antimony, and for Recovery of Antimony employed.

I, James Woolford, of No. 659, Commercial Road East, in the County of London, England, metallurgist, do hereby declare the nature of my invention for "A Process for extracting Precious Metals from Refractory Ores by Means of Antimony, and for Recovery of the Antimony employed," and in what manner the same is to be used and performed, to be particularly described and ascertained by the following statement:—

My invention relates to the extraction of precious metals from refractory ores by treating with antimony-oxides, and to the recovery of the antimony employed in this treatment.

The ore, whether in its natural state or in the state of clinkers after roasting or other treatment, is crushed, and thoroughly mixed with an equal weight of antimony-trioxide, with half its weight of the residue from reduction of antimony-oxide, and with half its weight of finely-pulverised coal or charcoal. The mixture being fused in a cupola or other suitable furnace, the antimony-oxide is reduced, and the antimony forms an alloy with the precious metal. This alloy is tapped off, and treated in an oxidizing furnace the bed of which is glazed with a mixture of borax and sulphate of soda. In this furnace the antimony becomes oxidized, the oxide passing away as fumes, while the precious metal remains on the bed of the furnace.

Successive batches of the alloy may be treated until there is accumulation of the precious metal sufficient for being run off.

The combustion-gases, with the fumes of antimony-oxide, are drawn by a fan through cooling-passages and depositing-chambers, in which a large proportion of the oxide is deposited. In order to recover the last portions of the oxide, and clear the gases from it, I employ, in conjuncton with the fan which creates the draught through the cooling-passages and depositing-chambers, a nozzle furnishing a water-spray which mingles with the gases and fumes, and is effectually mixed up with them by the blades of the fan. The water, with the oxide suspended in it, is drawn away from the lower part of the fan, while the gases pass away to a chimney or elsewhere almost entirely free from fumes. Fig. 1 of the accompanying drawings is an elevation partly in section, and Fig. 2 is a transverse section of the fan and water-nozzle; A is the conduit leading the fumes from the depositing-chambers and cooling-passages to the suction-fan, B.

In the passage A is arranged a distributing-nozzle E, by which water is sent in spray to mingle with the fumes as they enter the fan, the blades of which break up the water and dash it about along with the fumes, causing separation of the particles suspended in them.

While the gases thus cleared of the suspended particles pass away by the conduit C to a chimney or other discharge, the water mixed with the solid particles collects in the lower part of the fan, and flows out to depositing-tanks D, in which the solid material is collected. Instead of sending water alone by the nozzle E, water mingled with steam may be sent into the conduit, the steam being used as an injector-jet to cause the water to leave the nozzle with great speed and in a greatly-subdivided condition.

The oxide collected in the cooling-passages and deposit-chambers, as well as that removed from the depositing-tanks D, and dried, may be used to treat fresh batches of ore, or may be reduced in any known way, so as to obtain metallic antimony.

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 herein-described process for extracting precious metals from refractory ores by fusing the crushed ore intimately mixed with antimony-oxides and pulverised fuel, thus producing an alloy of antimony with the precious metals, treating the alloy in a suitable furnace, thereby oxidizing the antimony and driving the oxide off as fumes, leaving the precious metals on the furnace-bed.

2. The herein-described method of recovering the antimony by causing the combustion-gases and fumes to pass from the oxidizing-furnace through cooling-passages and depositing-chambers by means of a fan, wherein the gases and residuary fumes are mixed with water, and whence the gases pass away, while the oxide, suspended in water, is drawn off to depositing-chambers.

Dated this 29th day of July, 1896.

James Woolford.

Improvements in Apparatus for the Recovery of Precious Metals from their Solutions.

I, Henry Livingstone Sulman, at present residing at Day Dawn, Murchison Goldfields, Western Australia, metallurgist and analytical chemist, do hereby declare the nature of my invention for