AN IMPROVED PROCESS FOR THE TREATMENT OF ZINCIFEROUS ORES.

I, Ernest Frederick Turner, of the Adelaide University, Adelaide, in the Province of South Australia, analytical chemist, do hereby declare the nature of my invention for "An Improved Process for the Treatment of Zinciferous Ores," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to an improved process for the treatment of zinciferous ores, and more particularly that class of ores which contains also gold, platinum, silver, or lead. The object of my invention is to remove the zinc from the ore, subsequently recovering the same in metallic form, and afterwards treating the ore-stuff for recovery of the lead and other metals contained therein.

In my invention, the ore in a suitable state of division is roasted or otherwise heated at a high temperature, either above or after being previously mixed with carbon. During the roasting or heating operation a stream of superheated steam is passed through the roaster or otherwise brought in contact with the ore under treatment. By this means the ore is oxidized and H_2S given off where the ore is being treated alone, or H_2S with hydrogen, and CO where carbon has previously been mixed with the ore. The gas so given off is collected in a suitable gasometer for use as fuel, and the products of combustion returned for treatment of the oxidized ore in the following manner: The oxidized ore, accompanied by water containing salt, is caused to fall through a suitable tower, through which at the same time a stream of SO_2, obtained as previously indicated, is constantly ascending. By this means the whole of the ZnO is converted into $ZnSO_3$ (zinc-sulphite), which is later removed from the ore by lixiviation, together with any copper which may be present. At the same time, by the action of the SO_2, the oxide of lead is partially converted into sulphite of lead, and the silver-sulphite into silver-chloride.

The liquor from the zinc lixiviating-vats is passed over copper, to remove any silver which may be in solution, and afterwards through zinc turnings for the recovery of any copper and lead. The liquor is then passed through towers through which H_2S, obtained as previously indicated, is passing, and thereby the zinc contained therein is precipitated as sulphide together with sulphur.

The ore-stuff remaining in the lixiviating-tanks after the liquor containing the zinc has been drawn off is then heated, whereby the sulphite of lead breaks up into sulphide of lead and sulphate of lead, and the two being in contact with any oxide of lead which is still undecomposed in the first operation by the action of SO_2 soft metallic lead is produced. Or, if the ore-stuff contains silver, it is mixed with zinc-chloride, either alone or with the addition of metallic zinc or other suitable metal, and then heated for the obtaining of the lead as soft metallic lead. The chlorides of silver, gold, and other metals will then still remain with the zinc-chloride, and can be separated therefrom by lixiviation or by any other suitable means.

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 zinciferous ores, the herein-described process, consisting in, first, oxidizing the ore in a suitable roaster, then causing the oxidized ore, accompanied by water containing salt, to be acted upon by a stream of SO_2, whereby the whole of the oxide of zinc is converted into sulphite of zinc and hypo-sulphite of zinc, the oxide of lead into sulphite of lead, and the sulphite of silver (if any) into chloride of silver; subsequently extracting the sulphite of zinc by lixiviation, and treating the liquor by H_2S, whereby the zinc-sulphites are precipitated as sulphides; subsequently removing the same; and treating by any known process; at the same time taking the ore-stuff remaining after the liquor has been drawn off containing the sulphites of zinc, subsequently heating the same, either alone or with zinc-chloride alone, or with zinc-chloride and metallic zinc, or other suitable metal, whereby the sulphite of lead breaks up into sulphide of lead and sulphate of lead, and soft metallic lead is produced, the chloride of silver being subsequently separated from the zinc-chloride by lixiviation or any other suitable method.

2. In the treatment of zinciferous ores, the herein-described process, consisting in, first, oxidizing the ore in a suitable roaster, then causing the oxidized ore, accompanied by water containing salt, to be acted upon by a stream of SO_2, whereby the whole of the oxide of zinc is converted into sulphite of zinc and hypo-sulphite of zinc, subsequently extracting the sulphite and hypo-sulphite of zinc by lixiviation, and treating the liquor containing the same by H_2S, whereby the zinc-sulphites are precipitated as sulphide; subsequently recovering the same in metallic form by any known process.

3. In the treatment of zinciferous ores, the within-described process, consisting of, first, roasting the ore, then converting the oxide of lead into sulphite of lead, and the silver-sulphite into silver-chloride, preferably by the action of SO_2 or other known process; subsequently taking the ore-stuff remaining after the removal of the zinc by lixiviation and heating the same, either alone or with zinc-chloride alone, or with zinc-chloride and metallic zinc, or other suitable metal, whereby the sulphite of lead breaks up into sulphide of lead and sulphate of lead, and soft metallic lead is produced, the chloride of silver and other precious metals being subsequently separated from the zinc-chloride by lixiviation or any other suitable method.

Dated this 21st day of July, 1896. E. F. TURNER.

AN IMPROVED DREDGE.

I, George Poll, of 54, Lambton Quay, in the City of Wellington, in the Colony of New Zealand, miner, do hereby declare the nature of my invention for "An Improved Dredge," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of my invention is to provide a dredge for use in harbours, rivers, and the like, for raising mud or other detritus, or gold-bearing deposits, which dredge shall lift the material to be raised in a more economical and effective manner than with dredges as at present constructed.