hopper J being filled the door I is closed to prevent any ingress of air to retort C. The door K is then opened, and the sulphatised material discharged into a truck, such as L, or other suitable arrangement for conveying the material to the leaching apparatus (not shown).

During the operation steam or water may, if desired, be injected into the retort C through a pipe R to facilitate the reaction. The retort C is maintained at a suitable temperature, which may be from 300° to 500° centigrade, by means of a furnace such as M, or it may be provided with a jacket and heated by superheated steam.

The ammonia-gas produced during the process in the retort C passes out through an opening N, and by the action of an injector O or other suitable means is forced through a pipe P into a vat, such as Q, or other suitable vessel, containing sulphate-of-zinc solution obtained by leaching the treated ore. In order to avoid loss of ammonia-gas by leakage the injector O or other suitable means should be so regulated as to maintain a slight vacuum in the retort.

Ammonium-sulphate in solution is thereby regenerated, and can be evaporated to dryness for use in treatment of fresh quantities of ore.

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 ores as herein mentioned, the conversion of the zinc- and, or, copper-oxides into sulphates of their respective metals by the action of sulphate and, or, sulphamate of ammonia.

2. In the treatment of ores as herein mentioned in which the zinc- and, or, copper-oxides have been converted into sulphates of their respective metals by the action of sulphate of ammonia and, or, sulphamate of ammonia, subsequently regenerating the ammonium-sulphate by passing the ammonia-gas produced during the first or sulphatising portion of the process through a solution of sulphate of zinc, substantially as specified.

3. In the treatment of ores as herein mentioned in which the zinc- and, or, copper-oxides have been converted into sulphates of their respective metals by the action of sulphate of ammonia and, or, sulphamate of ammonia, subsequently precipitating the zinc from its solution in the form of zinc-hydrate by passing through it ammonia-gas produced during the first or sulphatising portion of the process, substantially as specified.

4. In the treatment of ores as herein mentioned the within-described process, consisting in the conversion of the zinc- and, or, copper-oxides into sulphates of their respective metals by the action of sulphate and, or, sulphamate of ammonia, ammonia-gas being produced, then leaching by water the sulphates of zinc and, or, copper so obtained, and precipitatingthe copper, if any, and, or, iron, if any, by any usual means, subsequently passing the ammonia-gas produced during the sulphatising operation through the remaining solution of sulphate of zinc, whereby the zinc is precipitated as zinc-hydrate, and sulphate of ammonia is regenerated for the treatment of fresh supplies of ore, substantially as specified.

Dated this 5th day of October, 1896. W. E. Hughes.

Improvements in the Extraction of Precious Metals from their Ores or from Compounds containing the same.

I, James Mactear, of Victoria Mansions, London, England, chemical expert and engineer, do hereby declare the nature of my invention for "Improvements in the Extraction of Precious Metals from their Ores or from Compounds containing the same," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the extraction of precious metals from their ores, or from compounds containing the same, by the use of a solvent having a more economical and advantageous action than those at present in use.

The invention consists in the use, for the purpose of the invention, of a solution containing both cyanuric acid or a cyanurate and cyanide of potassium, or other cyanogen compound from which free hydrocyanic acid can be liberated by the addition of an acid or acid-salt or other substance or compound.

The proportionate quantity of the cyanuric acid relatively to that of the cyanide present in the solution will depend to a large extent upon the physical condition of the ore or compound under treatment, as, for example, in ores in which the gold is fine and free five parts of cyanuric acid to each one hundred parts of the cyanide will be found to give good results, but in some cases even a less proportionate quantity of the cyanuric acid may be used; while with more refractory ores, or those in which the gold is coarser, a larger proportionate quantity of the cyanuric acid may be used; but in very few cases will it be found necessary to use a greater proportionate quantity than twenty-five parts of the cyanuric acid to each one hundred parts of the cyanide.

The presence in a cyanide or cyanogen compound solution of cyanuric acid, free or combined, renders such solution much more active as a solvent of the precious metals than are solutions of cyanides or cyanogen compounds not containing cyanuric acid, such as have hitherto been used, and which are hereinafter referred to as "ordinary cyanide solutions," the action of the cyanuric-acid-contained cyanide solution upon the gold or silver being such as to avoid to a very considerable extent the objectionable action of ordinary cyanide solutions upon the base metal compounds commonly found in ores or other compounds containing the precious metals, and which hinders the obtainment of the precious metals; and, being much more rapid than that of ordinary cyanide solutions, with a given quantity of cyanogen in each solution, the cyanuric-acid-contained cyanide solution being also of further advantage in relation to ordinary cyanide solutions in requiring a less quantity of cyanide to effect the extraction of a given quantity of precious metal, other conditions being the same.