

UNITED STATES PATENT OFFICE.

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METHOD OF TREATING ORES.

1,364,573.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GRANVILLE MOORE, a citizen of the United States, and a resident of the city and county of San Francisco, State of California, have invented new and useful Improvements in Methods of Treating Ores, of which the following is a specification.

The invention relates to the process of extracting sulfur and metallic or chemical values from ores by subjecting said ores to dissolution or chemical decomposition by employing ozonized air in a suitable container with ore and sulfuric acid under the influence of heat.

The object of the invention is to render the extraction more effectual, complete and economical.

In my process sulfid ores, or a suitably proportionate mixture of sulfid and non-sulfid ores, are treated with sulfuric acid (H_2SO_4), in a suitable container under the influence of heat, and ozonized air (under pressure or without, as circumstances may require.)

This treatment causes the ores to decompose and the native values of the said ores to pass into solution or separate out in such a manner that they may be recovered later.

By this treatment the sulfids are converted to sulfates and at the same time free sulfur, sulfur dioxide, and sulfur trioxide in gaseous form are evolved. The sulfates are removed for subsequent treatment by known methods and fresh batches of sulfids supplied, while the said gases are treated with ozonized air. The free sulfur is precipitated and removed by appropriate methods, while the sulfur dioxide and sulfur trioxide are conveyed into another apparatus where the sulfur trioxide is thrown down, leaving only the sulfur dioxide which is then converted while in transit into sulfuric acid by known methods and this sulfuric acid is then returned to the original ore container for action on fresh batches of ore supplied thereto. The sulfur trioxide gas above mentioned is already in condition to form sulfuric acid by the addition of a water molecule which may be introduced as is well known by a water spray which results in the reaction $H_2O + SO_3 = H_2SO_4$, the sulfuric acid so formed being recovered from the bottom of the chamber and the sulfur dioxide passing on for further treatment. Some sulfur is probably also deposited with the sulfuric acid

but this is separated out in well known ways.

It will be seen that I recover a continuous supply of sulfuric acid available for retreatment or recovery as desired and the process is cyclic.

The mineral and chemical values contained in the solution before mentioned are recovered by well known chemical means or by electrolysis.

I am aware that it is old in the art to treat sulfid ores with sulfuric acid and ozonized air, but I am not aware that it has been proposed to treat the resultant gases in such way as to generate therefrom sulfuric acid for action on fresh batches of ore, thus producing a continuous cyclic process from a single supply of sulfuric acid.

I claim:

1. The process of treating sulfid ores which consists in subjecting them in a closed container to the action of sulfuric acid and ozonized air under the influence of heat, then converting the resultant sulfur dioxide while in transit into sulfuric acid and returning this acid to the ore container for action on fresh batches of ore.

2. The process of treating sulfid ores which consists in subjecting them in a closed container to the action of sulfuric acid and ozonized air under the influence of heat, whereby the sulfids are converted into sulfates and free sulfur, sulfur dioxide, and sulfur trioxide in gaseous form are evolved, then eliminating the free sulfur and sulfur trioxide, and converting the sulfur dioxide while in transit into sulfuric acid and returning this acid to the ore container for action on fresh batches of ore.

3. The process of treating sulfid ores which consists in subjecting them in a closed container to the action of sulfuric acid and ozonized air under the influence of heat, whereby the sulfids are converted into sulfates, and free sulfur, sulfur dioxide, and sulfur trioxide in gaseous form are evolved, then conveying said gases to another container and there subjecting them to ozonized air, then eliminating the free sulfur and sulfur trioxide and converting the sulfur dioxide while in transit into sulfuric acid and returning this acid to the ore container for action on fresh batches of ore.

In testimony whereof, I have hereunto set my hand at San Francisco, California.
GRANVILLE MOORE.