

UNITED STATES PATENT OFFICE.

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SMELTING SULFID ORES.

No. 882,234.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, JAMES TAYLOR CARRICK, a British subject, residing at 1 Baines Buildings, Commissioner street, Johannesburg, in the colony of the Transvaal, and STUART PATTISON, a British subject, residing at 128 Cullinan Buildings, Simmonds street, Johannesburg aforesaid, have invented certain new and useful Improvements in Smelting Sulfid Ores, of which the following is a specification.

This invention relates to the treatment of pyritic copper or nickel or copper nickel, sulfid ores, which are poor in sulfur available as fuel and are therefore unsuited for pure pyritic smelting but require the use of additional fuel, such as coke, and which, upon smelting in the usual manner, yield a matte soluble to a greater or less extent in acid with evolution of sulfureted hydrogen.

The object of the invention is an improvement in the commonly accepted process of smelting such ores, such that by the utilization of gaseous fuel produced from the matte itself the consumption of coke or other fuel may be economized and an intense local heat may be produced in the cupola such as to obviate freezing of the charge near the twyers. According to this invention therefore the matte such as is ordinarily produced, is treated with dilute acid for the production of sulfureted hydrogen, which gas is used as fuel in the cupola, during a subsequent blast, for the purpose stated.

In a typical example where a pyritic copper nickel ore is under treatment, the matte produced by the smelting of a first charge, consisting substantially of a mixture, of the monosulfids of copper, nickel, and iron, is withdrawn from cupola, pulverized and treated with dilute sulfuric acid in a suitable digester. Where circumstances allow and render it economically advisable the acid would be manufactured from the sulfur dioxide which is passed off from the cupola during smelting. The sulfureted hydrogen evolved from the digester is passed into a gas holder from which it is passed by pipes to a special set of twyers located adjacent to the air twyers of the cupola: and in burning with the air constitutes a part or the whole of the additional fuel over and above the available fuel in the ore necessary for the reduction of further quantities of ore. As indicated

above the intense heat so produced in the neighborhood of the twyers, prevents the formation of crusts at that point and so enables the whole series of twyers to be kept continually in blast.

A further effect of the use of sulfureted hydrogen is that the percentage of sulfur dioxide in the flue gases is increased thereby rendering it commercially possible to produce sulfuric acid from such gases, when it might otherwise be impracticable. The acid thus produced may, as stated, be utilized for digesting the matte for the production of a further quantity of sulfureted hydrogen. From the residue in the digester, the high grade insoluble copper sulfid containing usually a small percentage of nickel sulfid is separated and may be shipped to special treatment works or treated upon the spot as may be convenient; while the liquor which may contain a percentage of copper is treated, for instance, by crystallization, for the recovery of the iron and nickel sulfates, or electrolytically for the recovery of the copper and nickel.

We claim as our invention:

1. The process of treating sulfid ores of the class specified which consists in smelting the ore to produce a matte, treating such matte for the production of sulfureted hydrogen, utilizing such gas as fuel in subsequent smelting, and treating the residues resulting from the treatment of the matte for the recovery of the metals therefrom.

2. In the smelting of sulfid ores of the class specified, the process of treating matte with dilute sulfuric acid for the production of sulfureted hydrogen, utilizing such gas as fuel in subsequent smelting, treating the flue gases, of which the sulfur dioxide contents have been enriched by the sulfureted hydrogen, for the manufacture of sulfuric acid and digesting the matte with such sulfuric acid for the production of a further quantity of sulfureted hydrogen, and utilizing such gas as fuel in subsequent smelting.

In testimony whereof we affix our signatures in presence of two witnesses.

JAMES TAYLOR CARRICK.
STUART PATTISON.

Witnesses:

HAROLD ERNEST KISCH,
JABEZ WARREN VENNING.