UNITED STATES PATENT OFFICE.

PIERRE DE PEYSTER RICKETTS AND TOM COBB KING, OF NEW YORK, N. Y., ASSIGNORS TO NATIONAL METALLURGIC COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD OF PREPARING PYRITES FINES FOR DESULFURIZATION.

No. 894,799. Specification of Letters Patent. Patented July 28, 1908.

Original application filed May 4, 1905, Serial No. 258,895. Divided and this application filed November 20, 1905. Serial No. 288,162.

To all whom it may concern:

Be it known that we, PIERRE DE PEYSTER RICKETTS and TOM COBB KING, both citizens of the United States, residing at New York, in the county of New York and State of New York, have jointly discovered or invented a new and useful Improvement in Methods of Preparing Pyrites Fines for Desulfurization, of which the following is a description.

Our invention relates to method of preparing and treating pyrites fines for use in burners or kilns for desulfurizing.

The object of our invention is to produce from pyrites fines, hardened, artificially formed lumps, shapes or bodies of pyrites, free from extraneous harmful binding ingredients, and possessing the following features or characteristics, viz: density and hardness sufficient to prevent crumbling or crushing in shipment or handling, substantially anhydrous in character, therefore not liable to disintegrate when brought in contact with moisture, not liable during burning to create a dust like material liable to contaminate the acid produced therefrom, and finally possessing the characteristic of burning freely in an ordinary burner or kiln. We accomplish this object by means of the method or process of treating pyrites fines which consists of mixing with the fines a requisite quantity or percentum of fusible sulfid Fe_7S_8, sulfur and iron, or other sulfur compound, which when made viscous or liquid, as hereinafter more specifically described, permeates the mass cohering the particles thereof and when cool converting the same into a solid body, possessing the characteristics heretofore herein specified.

Pyrites fines exist in large quantities and are constantly being produced as there are many deposits of ore in which the ore is so friable and crumbly that the least handling produces fines.

Heretofore, so far as we are aware, the use of pyrites fines in the manufacture of sulfuric acid has been attended with serious difficulties, as, for instance, loss in transportation of the fines, due to the finely divided condition of the material, contamination of the acids produced therefrom, occasioned by the presence therein of numerous particles of dust like material carried over from the kilns or burners into the flues and Glover towers, and finally, owing to the pulverulent nature of the material, the difficulty of maintaining free combustion, and of preventing the complete cessation of combustion (which occurs quite frequently unless prevented by the use of special burners).

It was quite generally recognized that the best possible way to utilize or prepare the fines for desulfurizing was to form the same into lumps, and numerous efforts have been made to cohere or form pyrites fines into solid lumps or bodies, and while successful in so far as the production of forms or briquets of sufficient hardness to bear transportation is concerned, these efforts failed utterly to produce hardened lumps or forms of pyrites free from extraneous harmful binder substances, and without reducing the percentum of sulfur contained in the fines. The present invention successfully accomplishes this object.

In the practice of our invention we take the fines and mix therewith a requisite quantity or percentum of fusible sulfid, such as Fe_7S_8 (pyrrhotite) or ferrous sulfid, FeS, and like substances, or with the fines we mix sulfur and iron, and subject the mixture to heat, without access of air, or in a reducing atmosphere thereby taking advantage of the fusing temperature of the sulfur compounds which are lower than the fusing temperature of the pyrites fines. The sulfur compounds become liquid or viscous, depending upon the temperature to which they are heated (at 114° centigrade sulfur is liquid or mobile; at 230° centigrade sulfur is viscous; at 800° centigrade sulfur becomes a gas) and permeate or are diffused through the material and binds the same into a coherent mass when the mixture is cooled, the sulfur of the sulfids or compounds becoming solid when cold.

In the practice of our invention to produce the shapes desired, we take the pyrites fines plus the sulfur compounds and place the mixture in a retort or mold which can be closed and apply heat thereto externally, adding pressure if desired, until the binding material fuses throughout the mass, using only sufficient heat to soften or liquefy the sulfur compounds without liquefying the

pyrites fines. We then remove the mold and allow the contents of the same to cool. Or the mixture may be pressed into briquets and in this form heated in a closed vessel or in a reducing atmosphere until the sulfur in the sulfids or compounds becomes viscous or liquid, then by cooling as heretofore, described solidify the same.

We are aware that lime and magnesia have been employed to bind or cohere the fines into lumps or bodies of sufficient hardness to bear transportation, but the mixture of the lime and magnesia not only impaired the burning capacity of the pyrites, but also introduced therein a foreign element which at certain temperatures served to effect stable compounds with the sulfur, thus reducing the percentum of sulfur in the lump or body formed.

We are also aware that ferrous and lead sulfates have been used as binders, producing a product sufficiently firm or hard for transportation. The use of these materials as binders was objectionable, however, inasmuch as their use introduced foreign materials, which not only impeded the free burning of the pyrites, but what is more objectionable, the said materials being absorbents of moisture, prevented the formation of a lump or shape, anhydrous in character, the produced body disintegrating when exposed to damp weather or when brought in contact with moisture. Another objection to these materials as binders is that the absorption of moisture interferes with the easy and satisfactory burning of the product for the purpose of desulfurizing.

We claim as our invention and desire to secure by Letters Patent:

1. The herein described method of preparing pyrites fines for desulfurization, which consists in adding to the fines and mixing therewith fusible sulfur compounds subjecting the mixture to heat sufficient to liquefy the sulfur compound in the mixture, reducing conditions being maintained during the application of the heat.

2. The herein described method of preparing pyrites fines for desulfurization which consists in adding to the fines and intimately mixing therewith a fusible sulfid, subjecting the mixture to the requisite heat in a reducing atmosphere, then cooling.

3. The herein described method of preparing pyrites fines for desulfurization, which consists in adding to and mixing with the fines a fusible sulfur compound, subjecting the mixture to heat sufficient to liquefy the sulfur compound whereby the same is caused to cohere and bind the mixture, then by pressure compress the same into desirable shape, and finally cooling.

In testimony whereof, we have hereunto signed our names in the presence of two subscribing witnesses.

PIERRE DE PEYSTER RICKETTS.
TOM COBB KING.

In the presence of—
GEO. R. A. RICKETTS,
CHARLES F. GRILL.