

UNITED STATES PATENT OFFICE

GEORGE G. CONVERS, OF SALISBURY, PENNSYLVANIA.

PROCESS OF REDUCING FRANKLINITE ORES.

SPECIFICATION forming part of Letters Patent No. 488,470, dated December 20, 1892.

Application filed February 29, 1892. Serial No. 423,281. (No model.)

To all whom it may concern:

Be it known that I, GEORGE G. CONVERS, a citizen of the United States, residing in Salisbury township, Lehigh county, State of Pennsylvania, have invented a new and useful Improvement in Processes for Reducing Ores Containing Franklinite, Willemite, and Zincite, of which invention the following is a specification.

10 The zinc ores of Sussex county, New Jersey, consist of an intimate mixture of franklinite, willemite, zincite, calcite and other gangue, together with irregular quantities of the silicates of manganese. This mixture is commonly known as franklinite ore. The only commercial method for the manufacture of spelter from these ores has been to work for that purpose the oxide produced by the Wetherill furnace or that collected in the manufacture of spiegeleisen; the amount of iron and manganese in the ores as they occur prohibiting their use in a large way in the ordinary spelter furnace.

25 I am familiar with Patent No. 297,480 dated April 22, 1884, for a process of reducing franklinite ores. In that patent it is specifically stated that the separation between franklinite and willemite is made by gravity jigging, but no provision is therein made for the separation from the franklinite of the zincite which, having almost the same specific gravity as franklinite, cannot be separated from it by jigging or any method depending upon specific gravity. The zincite is therefore lost so far as the manufacture of spelter is concerned.

35 The object of my invention is the separation of both the willemite and zincite from the franklinite in such condition that the willemite and zincite can both be used directly for the manufacture of spelter or oxide of zinc while the franklinite mineral after having been separated from the other minerals in the manner below described is greatly improved for the manufacture of the oxide of zinc, and the residuum from said franklinite is lower in silica and higher in manganese and iron, and therefore better adapted to the manufacture of spiegeleisen than the residuum obtained from the original franklinite ores.

50 In carrying out my process the ores if associated with large quantities of calcite or other

gangue and of the silicates of manganese, such as rhodonite, fowlerite and tephroite may be first hand-picked for the purpose of separating the lumps of ore containing these minerals from those consisting chiefly of willemite, zincite and franklinite. The last mentioned minerals, either pure or associated with some calcite or other gangue and some of the silicates of manganese are then crushed to such a size that the different minerals are broken apart sufficiently to be separated. The calcite or other gangue which may be associated with this crushed ore may then be removed by any gravity jig. The remaining portion of the crushed ore is then treated by heating it with reducing materials or in any other known way to render the franklinite magnetic, *i. e.*—susceptible to attraction by a magnet, and the then magnetic franklinite is separated from the willemite and zincite by the use of any magnetic separator, adapted for finely ground ores. The willemite and zincite are thus left in a state of sufficient purity to be worked directly in a Belgian or any other suitable furnace for the manufacture of spelter; and after making many tons of spelter from this prepared ore I have found that the life of the retorts is longer than when used in working the ordinary ores of zinc. The willemite and zincite may also be used if desired, for the manufacture of oxide of zinc employing for this purpose the Wetherill or any other suitable furnace.

85 I have above specified the use of the jig for the separation of the calcite and other gangue, before the magnetization and separation of the franklinite, but there is sometimes an economic advantage in deferring the operation of jigging until after the magnetization and separation of the franklinite, since the quantity of ore to be treated by jigging has then been lessened by the quantity of the franklinite separated. The franklinite containing but a small proportion, if any of willemite or zincite, is then treated in the Wetherill or any other suitable furnace for the manufacture of the oxide of zinc and I have found on a practical test after treating many tons of this separated franklinite that it can be worked in larger charges and can be more closely and profitably worked than the origi-

nal ore. The residuum from this separated franklinite is then smelted in the usual way for the manufacture of spiegeleisen.

I claim:

- 5 1. The herein described process of treating ores containing franklinite, willemite and zincite, which consists in treating the franklinite to render it magnetic, separating it by magnets from the willemite and zincite, re-
10 ducing the willemite and zincite to spelter by a Belgian or other suitable furnace, treating the franklinite in the Wetherill or other suitable furnace for the manufacture of oxide of zinc and smelting the residuum from the
15 franklinite for spiegeleisen, substantially as set forth.
2. For the manufacture of spelter from ores containing franklinite, willemite and zincite, the process consisting in treating the frank-
20 linite to render it magnetic, separating it by magnets from the willemite and zincite, and reducing the willemite and zincite to spelter by a Belgian or other suitable furnace, sub-
stantially as set forth.
- 25 3. For the manufacture of the oxide of zinc

from ores containing franklinite, willemite and zincite, the process consisting in treating the franklinite to render it magnetic, separating it by magnets from the willemite and zincite, reducing the willemite and zincite to spelter by the Belgian or other suitable furnace, and treating the franklinite in the Wetherill or other suitable furnace for the manufacture of oxide of zinc, substantially as set forth.

4. For the manufacture of oxide of zinc from ores containing franklinite, willemite and zincite, the process consisting in treating the franklinite to render it magnetic, separating it by magnets from the willemite and zincite, and treating the separated franklinite alone and the willemite and zincite together in the Wetherill or other suitable furnace for the manufacture of the oxide of zinc, substantially as set forth.

GEORGE G. CONVERS.

Witnesses:

CHAS. W. CLEWELL,
ALLEN FELJENGER.