UNITED STATES PATENT OFFICE.

GEORGE G. CONVERS, OF SALISBURY, PENNSYLVANIA.

PROCESS OF TREATING FRANKLINITE AND WILLEMITE.

SPECIFICATION forming part of Letters Patent No. 488,471, dated December 20, 1892.

Application filed July 25, 1892. Serial No. 441,178. (No specimens.)

To all whom it may concern:

Be it known that I, GEORGE G. CONVERS, a citizen of the United States, residing at Salisbury township, in the county of Lehigh and State of Pennsylvania, have invented certain new and useful Improvements in Processes of Treating Franklinite and Willemite; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in the metallurgy of the natural product met with in certain localities, and consisting of an ore whose principal zinc-bearing constituents are franklinite and willemite.

The object of my invention is to realize a more economical utilization of this mixture, both with respect to the quality and quantity of the products to be derived therefrom, and with respect to the wear upon the furnace or retorts incident to its reduction. To this end I effect so complete a separation of the franklinite from the willemite as to enable the former to be used to much greater advantage for the manufacture of oxide of zinc and of spiegeleisen, and the willemite to be used directly for the manufacture of spelter or of oxide of zinc, and with no more wear upon the retorts employed than is experienced in such retorts in working ordinary ores of zinc.

In carrying out my invention the mixture of franklinite and willemite is first crushed to such a size that its constituent minerals are broken apart sufficiently to be separated. Upon crushing the ore as described, the particles of willemite are, in the main, of notably larger grain than the particles of franklinite. This crushed ore is then treated in any way to render the franklinite magnetic, preferably by heating it with reducing materials, and the franklinite thus rendered magnetic is thereupon removed from the ore by the use of a magnetic separator. I find that I secure the best results by crushing the ore sufficiently to just permit the largest particles to pass through a screen of No. 8 mesh, and by feeding the crushed mixture from a feed hopper over and past a rotary magnetic separator, the franklinite in such case, by reason of the smaller size of its particles, which permits them to pass between the larger particles of the willemite, dropping nearer the rotating magnets, and thereby becoming more completely separated from the willemite than if the mixture had been ground to a lower and uniform size after being crushed. Moreover, the fact that the particles of willemite are larger has a tendency to reduce their liability to volatilization should the preparatory operation, wherein the franklinite is made magnetic in the presence of reducing materials, be accidentally stimulated above the normal temperature suitable to it. The willemite, after the magnetic separation, is left in a state of sufficient purity to be worked directly in a Belgian or other suitable furnace for the manufacture of spelter. It may also be used for the manufacture of oxide of zinc, employing for this purpose the Wetherill or other suitable furnace. The separated magnetic franklinite is treated in the Wetherill or other suitable furnace for the manufacture of oxide of zinc, and the residuum from this process is smelted in the usual way for the manufacture of spiegeleisen. The franklinite, separated in accordance with my invention, I find can be worked in larger charges and more closely and profitably than the original ore, and the retorts used for the reduction of the willemite have as long a life as when used in working ordinary ores of zinc; the entire operation, taken as a whole, therefore, effecting an important economical improvement in the metallurgy of the natural product treated.

Having thus described my invention, what I claim is:

1. The herein described process of treating ores containing franklinite and willemite, which consists in treating the ore to render the franklinite magnetic, separating it by magnets from the willemite, reducing the willemite to spelter in 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 franklinite for spiegeleisen; substantially as set forth.

2. For the manufacture of spelter from ores

containing franklinite and willemite, the process of treating the ore to render the franklinite magnetic, separating it by magnets from the willemite, reducing the willemite to spelter by a Belgian or other suitable furnace; substantially as set forth.

3. For the manufacture of oxide of zinc from ores containing franklinite and willemite, the process of treating the ore to render the franklinite magnetic, separating it by magnets from the willemite, reducing the willemite 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 described.

4. In the metallurgy of ore containing franklinite and willemite, the process of treating the ore to render the franklinite magnetic, separating it by magnets from the willemite, subjecting the franklinite and willemite separately to furnace operations to obtain their final products, and smelting the residuum from the franklinite for spiegeleisen; substantially as described.

5. The herein described process of treating ores containing franklinite and willemite, which consists in crushing the ore so as to cause the main portion of the particles of willemite to be of larger grain than the particles of franklinite; rendering the franklinite magnetic as described; separating the franklinite by magnets from the willemite; and subsequently subjecting the franklinite and willemite separately to furnace operations to obtain their final products; substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE G. CONVERS.

Witnesses.
JOHN KLINE,
ARTHUR B. DE SAULLES.