

UNITED STATES PATENT OFFICE.

ABRAHAM T. HAY, OF BURLINGTON, IOWA.

PROCESS OF REDUCING GOLD, SILVER, &c.

SPECIFICATION forming part of Letters Patent No. 399,529, dated March 12, 1889.

Application filed October 4, 1888. Serial No. 287,198. (No specimens.)

To all whom it may concern:

Be it known that I, ABRAHAM T. HAY, a citizen of the United States, residing at Burlington, in the county of Des Moines and State of Iowa, have invented certain new and useful Improvements in the Process of Reducing Ores of Gold, Silver, &c.; and I do 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 is directed to the metallurgical reduction of various ores and the reviving of metals belonging to the gold and silver, copper, and lead groups.

I have found that by the agency of a ferruginous alkaline sponge, as hereinafter more particularly set forth, employed during the process of reduction I am enabled to produce new and valuable results in promoting the reduction, liquefying the cinder, and more completely reviving the metals desired to be obtained. Such a sponge is described in my pending application, filed September 25, 1888, Serial No. 286,385.

I will now describe, by way of example, a practical means for carrying my invention into effect for the reduction, in this instance, of an ore containing gold and silver, copper, and lead.

In a suitable retort or furnace—for instance, in the furnace described in my patent, No. 390,964, dated October 9, 1888—I produce a ferruginous alkaline sponge which shall be suitable for the metals which are to be acted upon in the reduction-furnace. For example, to prepare a sponge for the ore above specified, I place in said furnace a charge of about seventy-five (75) parts, by weight, of iron oxide—such, for instance, as the Pilot Knob ore of Missouri—fifteen (15) parts of aluminous substance—such as scrap-brick—five (5) parts of crude potash, five (5) parts of carbonate or other oxide or salt of soda, and fuse the same by a pressure or fan-blast, using from twenty (20) to fifty (50) parts of fuel—such as coke or charcoal—to every one hundred

(100) parts of the above stock. During this operation the electrical force is applied to the coils, using for about two miles of wire a generator having, say, from four to six gravity gallon cells, care being taken, by judicious changes in the proportions of the elements of the stock and in the electrical force applied, to meet varying barometrical and other atmospheric conditions and secure the desired result—namely, the production of a semi-metallic ferruginous alkaline sponge. This sponge is employed as a reagent in the proportion which will meet the requirements of the mineralized condition of the ore to be smelted—say in the proportion of one to two and one-half per cent. of the total stock—and is charged into the ore-reduction furnace with the rest of the stock. In its result it largely promotes the reduction of the stock, and liquefies the cinder to a remarkable extent.

Where it is necessary or desirable to eliminate phosphorus, an oxide of lime, or common limestone, may be added to the stock from which the sponge is prepared, say about seventy parts of iron ore, instead of seventy-five, and about five parts of the lime.

To aid in the obtainment of lead, either from the ore above specified or from an ordinary lead ore, I employ, as the proper element of the sponge, barium, using, preferably, in the production of the sponge about ten (10) parts of baryta or heavy spar, and reducing the proportion of the aluminous substance or substances to about five (5) parts.

Having thus described my invention, what I claim is—

The herein-described method of smelting ores—such as those of gold, silver, copper, and lead—consisting in reducing the ore, together with a ferruginous alkaline sponge, substantially as set forth.

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

ABRAHAM T. HAY.

Witnesses:

H. N. LOW,
E. K. STURTEVANT.