UNITED STATES PATENT OFFICE.

EDUARD DEDOLPH, OF MARYSVILLE, BRITISH COLUMBIA, CANADA.

PROCESS OF DESULFURIZING AND REDUCING SULFID ORES.

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To all whom it may concern:

Be it known that I, EDUARD DEDOLPH, a citizen of the United States, residing at Marysville, in the county of East Kootenay, Province of British Columbia, Dominion of Canada, have invented certain new and useful Improvements in Processes of Desulfurizing and Reducing Sulfid Ores, of which the following is a specification.

This invention relates to an improvement affecting the roasting and smelting operations in the treatment of sulfid ores of lead, copper, etc. Its objects are to cheapen and render more efficient the desulfurizing and reducing processes, and to enable ores containing a high percentage of impurities, as zinc, to be successfully treated.

The invention consists, broadly, in roasting the finely ground ore mixed intimately with finely divided carbonaceous fuel, in such fashion as to oxidize the sulfur and a portion only of the fuel, and then smelting the resulting product, consisting of the roasted ore and the unconsumed fuel or fixed carbon. According to this method, the roasting is effected partly by the external heat and partly by the heat developed by the consumption of the volatile constituents of the intermixed fuel. In like manner, the heat requisite for the smelting operation is supplied partly by the residual carbon intimately associated with the ore particles, and partly by the coke added in the blast furnace. There results a great gain in economy, not only because the finely divided fuel, as sawdust or coal screenings, is very cheap, but also because the efficiency of the fuel thus thoroughly commingled with the ore is considerably heightened.

I am aware that it has heretofore been proposed to roast ore mixed with fuel, but I lay no claim to this broadly. The great value of my invention appears more prominently in connection with the smelting operation. The roasting step has not only freed the ore from sulfur in a most efficient manner, the commingled fuel contributing to this result as noted, but by driving off the volatile portions of said fuel, reducing the latter to fixed carbon in the form of charcoal or coke, has converted it to the form suitable for the step of smelting. Moreover, as the result of the roasting operation, the residual fuel, or practically pure carbon, is left most intimately incorporated throughout the mass of the roasted ore, the effect of this peculiar condition as to the ore and carbon being to promote the smelting in an unlooked-for manner. The roasted product smelts with great readiness in the blast furnace; for example, I find that, in this way, it is possible to smelt easily a low grade ore containing a high percentage of zinc, which could not be smelted at all were the finely-divided fuel not added before roasting.

As an illustration of my process, I may mention the following: I first grind the ore in any usual manner, and to a charge of 1,800 pounds of this ground ore add about fifty pounds of sawdust. This charge, after the ore and sawdust have been thoroughly mixed, is placed in an ordinary roasting furnace and roasted in the usual manner until all the sulfur fumes have been driven off. During this operation, the volatile constituents of the sawdust, probably about seventy-five percent. thereof are consumed, thus saving the external fuel. The dense sulfur atmosphere formed in the roaster prevents the oxidation of the resulting fixed carbon or charcoal; and, at the end of the roasting, this remains intimately incorporated with the ore, as already described. During the smelting, which is carried on in a blast furnace in the usual manner, the twenty-five percent. of residual fuel, amounting to about twelve and a half pounds of finely-divided charcoal, saves in the neighborhood of thirty per cent. of coke or fifty four pounds per charge; and this saving is practically clear gain, since the cost of the sawdust is negligible. I find that by mixing the ground ore with comminuted fuel, roasting with but partial consumption of this fuel, and then smelting, it is possible to smelt ore running seventeen percent. zinc and which would not go through the furnace under any other circumstances. This adaptability of the process for use with zinciferous ores is one of its salient features, and constitutes an improvement of great practical importance.

It may be noted that my process may be used, where desired, in conjunction with the Huntington-Heberlein process.

While I have noted above certain weights and proportions, I desire it to be understood that these are merely for purposes of general illustration and are not intended to be at all quantitative in their character. Moreover, proportions will necessarily vary with the percentage of impurities.

What is claimed as new is:

1. The process of desulfurizing and reducing sulfid ores, which consists in roasting the ground ore intimately mixed with finely-divided carbonaceous fuel, in such fashion as to oxidize the sulfur and a portion only of the fuel, and then smelting the product consisting of the roasted ore and the unconsumed fuel.

2. The process of desulfurizing and reducing sulfid ores, which consists in roasting the ground ore intimately mixed with finely divided solid carbonaceous fuel, in such fashion as to drive off the sulfur and consume the volatile portions of the fuel without consuming the resultant fixed carbon, and then smelting the mixture of roasted ore and fixed carbon.

3. The process of desulfurizing and reducing sulfid ores, which consists in roasting the ground ore intimately mixed with sawdust, in such fashion as to drive off the sulfur and consume the volatile portions of the fuel, leaving charcoal, and then smelting the mingled roasted ore and charcoal.

4. The herein described method of treating ore containing sulfur and zinc as impurities, which consists in grinding the ore and mixing intimately with finely-divided carbonaceous fuel, roasting the mixture in such fashion as to oxidize the sulfur and consume the volatile constituents of the fuel, reducing the latter to fixed carbon, and then smelting the mingled roasted ore and fixed carbon in a blast furnace.

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

EDUARD DEDOLPH.

Witnesses:
WM. S. WARD,
LOUIS JOHNSON.