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METHOD AND APPARATUS FOR SMELTING.

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To all whom it may concern:

Be it known that we, JOHN OWEN AMBLER, HARRY HOWARD STOUT, and SPENCER BISHOP, citizens of the United States, residing at Clifton, in the county of Graham (Greenlee) and State of Arizona, have invented certain new and useful Improvements in Methods and Apparatus for Smelting, of which the following is a specification.

This invention relates generally to the smelting of ore for the extraction of metal therefrom.

In the extraction of copper, as an example, from its ores it is the practice to smelt the ore in blast furnaces, if the material is in relatively coarse condition, or in reverberatory furnaces, if the ore is in the form of relatively fine or small particles, to produce a matte and a slag which separate from each other in the furnace by reason of their different specific gravities. The lighter slag is skimmed off from time to time and thrown away while the matte is tapped at longer intervals and subjected to further treatment to remove ingredients such as iron and sulphur and leave the copper in a metallic state.

In the smelting of ores by the described method it has been heretofore the practice to intermittently charge smelting furnaces of the reverberatory type through holes in the roof which may be followed by the spreading of the material over the hearth with hand tools inserted through openings in the sides of the furnace. This method of charging is open to many serious objections.

The dropping of the charge intermittently through the roof openings from suitable hoppers causes the production of dust which combines with the silica brick with which the furnace is lined and fluxes or fuses the brick. It will be apparent that this action causes deterioration of the lining brick and necessitates expensive repairs.

The provision of charging openings in the roof cannot be effectively controlled to prevent the entry of "false air" to the interior of the furnace as a result of which dilution of the gases of combustion takes place with an attendant lowered temperature and reduction in the quantity of heat transmitted to the charge. The final result is a lowering of the furnace capacity with a corresponding substantial increase in the cost of the smelting operation. Attempts to lute or otherwise seal the connection between the feeding hoppers and the furnace roof at the openings invariably fail because of the variations in temperature and the resulting cracking and opening of the sealing material to permit access of air into the furnace.

The principal object of the present invention is to provide an ore smelting furnace which will be free from the objections referred to and in which the detrimental production of dust in the charging operation is overcome and the access of air to the furnace except through the firing openings is effectually prevented.

The invention includes the feeding of ore to the furnace in such manner that a bank of the charged material within the furnace covers and continually seals the charging openings during the smelting operation.

A preferred structural arrangement embodying the invention consists of a smelting furnace of the reverberatory type having charging openings in the side walls thereof through which ore is continuously fed by mechanical means, the rate of feeding being so regulated that a bank of accumulated charged material reaches a level within the furnace and adjacent the side walls thereof that is higher than the level of the charging openings and is there maintained to cover and continuously seal the inner ends of the charging openings and prevent the entrance of air therethrough into the furnace.

In the drawings in which a preferred form of the invention has been selected for illustration,

Figure 1 is a view in transverse vertical section of a furnace embodying the invention,

Figure 2 is a view in horizontal section taken on different levels of the furnace shown in Figure 1.

Referring to the drawings for a more detailed description there is shown at 1 a mass of suitable foundation material on which rests the hearth or bottom 2 of the furnace. The side walls 3 and 4 of the fur-