

# UNITED STATES PATENT OFFICE.

HARRY HOWARD STOUT, OF DOUGLAS, ARIZONA, ASSIGNOR OF FIFTY-FIVE PER CENT TO PHELPS DODGE CORPORATION, A CORPORATION OF NEW YORK.

COPPER-MATTING FURNACE AND METHOD OF CONSUMING FUEL THEREIN.

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*To all whom it may concern:*

Be it known that I, HARRY HOWARD STOUT, a citizen of the United States, residing at Douglas, in the county of Cochise and State of Arizona, have invented certain new and useful Improvements in Copper-Matting Furnaces and Methods of Consuming Fuel Therein, of which the following is a specification.

This invention relates to improvements in copper matting furnaces and methods of consuming fuel therein.

I have discovered in the operation of reverberatory furnaces, in the production of copper ore that the rated or actual capacity of such a furnace is far below its maximum or possible capacity. This deficiency in output, I attribute to the very principles upon which the construction of reverberatory furnaces is based, namely, the continual dropping of the arch of the furnace from the firing end to the skimming end. As is well known, the arch is dropped in this manner in order to obtain a reverberation of the flame and its deflection toward and over the ore upon the floor of the furnace, the generally accepted presumption having heretofore been that the heat is transferred to the ore by convection rather than by radiation. I have made the discovery through careful investigation, that the principles upon which the reverberatory furnace is constructed are erroneous and that the most effective method of transferring the heat is by radiation. Therefore one of the important objects of the present invention is to provide a copper matting furnace wholly distinct in its characteristic features of construction from the usually employed reverberatory furnace and in which the transfer of heat by radiation, and by radiation alone, is assured, the furnace of the present invention being therefore designed upon principles diametrically opposed to those upon which the reverberatory furnace is constructed. That I am warranted in making this radical departure from the heretofore generally accepted principles involved in the construction and operation of furnaces of this general type, is evidenced by the fact that in carrying out my invention I am enabled to increase and in fact multiply the output of such a furnace without, however, increasing the hearth area thereof.

in a given period of time in a matting furnace of this general type is the controlling factor in establishing the capacity or output of the furnace; the more fuel it is possible to consume in such a furnace, the greater will be the output of the furnace. In the reverberatory furnace, because of the dropping of the arch from the firing end to the skimming end which is considered essential in such a furnace, it is not possible to pass sufficient air through the furnace to support the combustion of a maximum quantity of fuel. The very nature of the furnace inhibits free and unrestricted passage of air therethrough and therefore the quantity of fuel which can be consumed is limited. In other words, in the reverberatory type of furnace the gas outlet is restricted, and as this is one of the disadvantages presented by this type of furnace, it is an object of the present invention to provide a copper matting furnace having an enlarged gas outlet so that the passage of air through the furnace is unrestricted thus enabling me to consume in the furnace a maximum quantity of fuel. In fact, my method of consuming fuel in a copper matting furnace constructed in accordance with my invention, involves the principle of utilizing the entire transverse combustion-sustaining area of the furnace for this purpose, and in this respect my invention differs radically from the reverberatory type of furnace in which, in fact, in addition to the restriction of the passage of air through the furnace, combustion is effected only in a more or less horizontal zone immediately above the slag line, thus utilizing only a relatively small portion of the transverse combustion-sustaining area of the furnace.

As before stated, one of the objects which I have in view is to provide for the consumption of a maximum quantity of fuel in any given period of time so as to proportionately increase the capacity or output of the furnace, and in addition I employ in my furnace at the firing end a plurality of rows of burners as distinguished from the single row of burners ordinarily employed in the reverberatory type of furnace and located immediately above the slag line.

In consideration of the foregoing it will be seen that my invention embraces two salient features, namely, first the provision of a copper matting furnace devoid of the

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