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BESSEMER PROCESS OF MAKING STEEL.

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The invention relates to the well known Bessemer process of making steel and its nature will be best understood from the following:

The Bessemer process for the manufacture of steel depends for its operation on the fact that when molten pig iron is subjected to the action of numerous jets of air blown through it, the impurities of the iron, carbon, manganese, silicon and, in the basic process, phosphorus are oxidized, having as a product, nearly pure iron. The oxidation of the impurities generates the heat necessary for the process. In the acid process, silicon contributes largely to the heat generated, and in the basic process, phosphorus is the big factor. This means that for successful operation of the Bessemer process, we must use a pig iron high in either silica or phosphorus, depending upon whether it is acid or basic. High silicon iron requiring higher fuel consumption in the blast furnace, demands a correspondingly high price, while high phosphorus iron is not available in the United States in sufficient quantities to make possible a basic Bessemer industry. Over fifty percent of the total heat developed by the reactions in the Bessemer process is lost as sensible heat in the waste gases. Any method therefor which will make possible decreasing at will the quantity of this gas, (and, therefore, the loss of sensible heat by waste) will first lower materially the chemical requirements of the iron, i. e., in the acid process, the silicon, and in the basic, the phosphorus. That is to say, the process may be carried out with what are now known as "non-Bessemer" pig. Further, it will relieve the operator from the necessity of mixing various grades of pig iron in order to start with a more or less definite chemical analysis, as instead of regulating the amount of heat generated, he will now regulate or secure the temperature of his bath by regulating the amount of heat carried away in his gases.

My process, therefore, consists in determining the net blow heat required in any given case and in so regulating the amount of heat which is wasted as to secure the necessary net blow heat. This is done through decreasing the amount of nitrogen in the blast, whereby the waste nitrogen gases will not carry away more than the allowable proportion of heat, as waste.

It is preferred to obtain the above effects and advantages by regulating the oxygen content of the blast. This will be accomplished by enriching the air to any percentage oxygen desired, prior to its passage through the converter. The oxygen will reduce the proportion of nitrogen in the blast and hence the volume of waste nitrogen gas, the amount of which may be thus controlled.

In addition to the above mentioned features, this process will enable the operator to finish his metal at a high temperature without danger of over oxidation. By this practice, he may impart sufficient temperature to the steel to permit of its being allowed to stand in the ladle a considerable time before teeming. Molten steel which is permitted to stand in this manner will be of a better grade in that a considerable portion of the included impurities will have the opportunity to rise to the surface with the slag. There is thus a time factor not heretofore available, while in addition the metal is more fluid so that the impurities in suspension may rise more readily. Hence, the Bessemer process is improved.

Further, in the case of the basic process in which phosphorus is eliminated from the bath, the slag so formed will have an appreciable amount of calcium phosphate and may be utilized as a fertilizer.

I claim:

1. The method of carrying out the Bessemer process of making steel with non-Bessemer pig which consists in enriching the blast air with oxygen in an amount sufficient to reduce the proportion of nitrogen in the blast in an amount such that the nitrogen absorbs only an allowable proportion of the heat so that the net heat of the blow will satisfy the requirements.

2. The method of making a high phosphorus slag which may be used for fertilizer, when using an iron in which the phosphorus is too low to be classed as a basic Bessemer

iron under the present Bessemer requirements which consists in enriching the oxygen in the blast.

3. The method of making steel which comprises determining the net blow heat required to Bessemerize a normally non-Bessemer pig and then proportioning the amount of oxygen to the amount of inert gases in the blast so as to reduce the heat in the waste to the point which will give the blow heat required.

In testimony whereof, I have hereunto signed my name.

FRANK W. DAVIS.