The gas is reversed every 15 minutes and a temperature can easily be reached at which the purest silica sand will melt, the melter has to constantly keep his eye on the roof and walls and check the gas when the heat shows signs of melting the brickwork. Where natural gas is used it is not regenerated owing to its high calorific power.

The foundations of the furnace structure must be deep and strong, the furnace hearth being entirely separated from the checker chambers and built in solidly underneath to prevent loss of steel in case of the metal working through the bottom.

The walls and roof are subject to great strain and wear, a general thickness of nine inches silica brick gives the best service, various arch shapes are given to the roof, the exact shape between certain limits is non-essential. It was for some time supposed that the space above the hearth should be as small as possible, this soon caused great havoc with the low roof. Now the tendency is to have a high roof, protected from the direct flame, and utilize more completely the heat by radiation, not allowing the flame to impinge on the bath. This principle was proved by Mr. Fred. Siemens.

The furnace is built into a framework of steel sheet, channels, and bracing bars, so constructed as to give the best support against expansion and to preserve the shape of the parts.

The box through which the gas enters (when natural gas is used) the doors, and often the ports which provide entrance and exit for the gases are water-cooled, thus greatly increasing their endurance and that of the men in charge.

The ports through which the gas and air enter the melting chamber constitute the most important detail of construction, as

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TOTAL HEAT PRODUCED.

Heat from combustion of gas 168.5 CM x 8480=.....	1,428,880 cal.
" " " of C, Mn, P, Si & Fe.....	143,000
	1,571,880

LOSSES.

From waste gases.....	214,690
Allowing 10% excess of air	14,000
Absorbed in melting and heating.....	290,000
Radiation (by diff.)	1,053,190

The above calculation can only be considered approximately correct, owing to our uncertainty as to the specific heats at high temps; however, the fact that an empty furnace requires nearly as much gas to keep the temperature at working heat as when the charge is in, proves the general truth of the above figures, which show that the radiation at this temperature must amount to about 67% of the available calorific power of the fuel.