THE MODERN BASIC OPEN HEARTH PROCESS.

mitted in the pig metal used supposing it to constitute half the charge, by procuring pure limestone, however, as free from SiO_2 as possible the silicon, of the metal may be raised to a limit dependent on the amount of slag which is required. The advantage of deriving all the silicon required from the pig metal is apparent, the higher the silicon the lower the sulphur, which cannot be cheaply removed in the open hearth or in any process yet devised, except in the blast furnace.

A certain amount of iron (about 12%) and considerable manganese is oxidized and enters the slag, increasing its fluidity.

Just before tapping 80 pounds of ferro-manganese (carrying 80% Mn) is added to the bath, to take up and remove excess of oxygen in solution, which would render the heat wild in tapping, — the manganese originally present in the charge has been reduced to about .15 to .10%.

The tapping hole is carefully pricked and the metal and cinder run down a trough into the ladle (see plate 2), which holds the metal and the covering of about eight inches of cinder, the rest of the cinder runs over and settles in the pit below. Fifty pounds of ferro-silicon is added to the steel as it runs into the ladle along with enough ferro-manganese and anthracite coal or coke dust to give the carbon and manganese ordered for that particular steel. The ladle in which the steel lies is conveyed by a capacious truck to the end of the building (see plate 3) where it is lifted up by a massive hydraulic crane swung around over moulds arranged on buggies into which the steel is run by raising the stopper. Very often, especially where large ingots are required, the steel is poured into moulds arranged in a pit surrounding the ladle crane carrying the ladle (see plate), these large ingots are generally bottom cast, i.e., the metal flows down a fire-clay pipe enclosed by a strong iron casting and proceeds by two horizontal branches filling the moulds from the bottom, this facilitates greater soundness and freedom from blow holes in the ingots.

The total loss of iron in making steel by this processs amounts to 4 or 5%.

The acid and basic open hearth processes have an entirely different relation to each other than the acid and basic Bessemer process. In the latter process the metal used must be either low or high in phosphorous to admit of successful working, while in the acid and basic open hearth the same stock can be used for both if the phosphorous and silicon be low. It is possible to remove any quantity

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