

minutes, when about 4 per cent of the slacked lime was added. After this material was thoroughly mixed and a sufficient quantity had been accumulated, a sufficient amount of the same to make 4 tons of steel was charged into the electric furnace; about 100 pounds of steel scrap was scattered over the top of the same, and a small

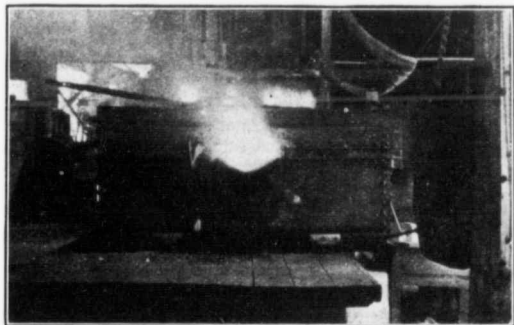


Fig. 3—Electric Furnace in Operation.

bar was put into the furnace to form an arc for the electrodes; the electrodes were then lowered into position, the current turned on, and the furnace closed up tight, and the entire batch of material was melted. After the same was thoroughly melted, the slag was poured off into the slag ladle, and a refining slag put into the furnace for the final refining of the metal; on completion of this operation, the metal was poured into the casting ladle, thoroughly draining the furnace, and the same cast into ingots, when the next charge was added and the operation repeated as described above.

A full report describing the entire operation at this plant of all the heats made would be very lengthy, during the making of the first 10 or 12 heats no attention was paid to getting definite results, but the first runs were for the purpose of familiarizing the men with the process, and

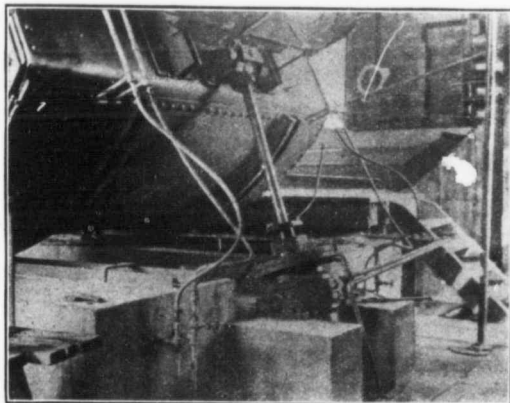


Fig. 4—Furnace Hydraulic Tilting Mechanism.

the furnace operation, and also to ascertain the best method of charging, refining, etc.

METHOD OF CHARGING FOR BEST RESULTS.

Some of these heats were made with the material in the form of bricks, the same being preheated in the stack

of the furnace before charging, and while this method did not give the best results in every respect, it is believed that the future operation of a large plant would be along these lines, or along the lines of preheating the mixture without briquetting, because from a theoretical standpoint, this method is ideal, making use, as it does, of the waste heat of the furnace for a partial reduction of the material.

The best results obtained came from the method of charging loose material into the furnace in bulks; these results proved beyond a doubt the commercial possibility of the process for making steel from a mixture in which a large quantity of ore is used, and it leaves the possibility for still better records, when proper arrangements are made for a preliminary treatment of this mixture by the waste heat of the furnace before charging.

WHAT WAS ACCOMPLISHED.

An average of the second half of the run in which the material was charged in bulk as above described,

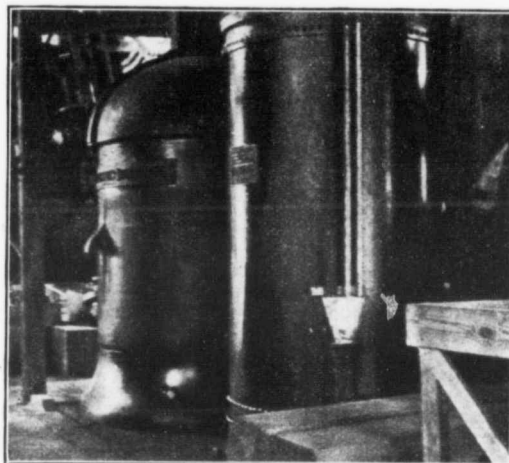


Fig. 5—The Transformer Room.

gave a result that proves conclusively that one gross ton of steel can be easily made for $\frac{1}{4}$ of an electric h.p. year.

An average of the same heat proved that the electrode consumption would be less than 50 pounds of electrodes per gross ton, and the yield of the metallic contents charged into the furnace, owing to its non-oxidizing atmosphere, is better than that obtained in the regular O. H. practice.

In making steel by this process, and laying aside entirely the fact that it is a commercial proposition, owing to the low cost of producing the same, the results obtained in the quality of steel made were more than satisfactory. It must be borne in mind, that the largest part of the material from which this steel is made, is metallic iron in its native state, in the form of ore, and that when this material is mixed with granulated pig iron, all of the metallic contents come direct from the native iron; the physical quality of the steel thus made is in every respect superior to steel made by the regular process of scrap and pig, even when the chemical analyses are about the same.

Then the high heats in the electric furnace permits of a better condition for refining and pouring. In a number of heats made at this plant, in which the sulphur and phos-