

charges of ore and charcoal are raised to the charging stage by a 16-h.p. motor.

The crucible hearth or melting chamber rests on a solid concrete bed, and like the body is encased in boiler plate, which here is 15 mm. thick. At the point where the weight of the dome is taken, the shell is reinforced by a steel band having a section of 200 mm. x 18 mm. The lining of refractory material is covered with magnesia bricks, and the floor of the hearth is formed of magnesia bound with tar. Fig. 3 shows the original section of the hearth, and its appearance after six months' working.

Four electrodes, (E, Figs. 1 and 2) two to each phase of the two-phase current used, pass through asbestos-packed gas-tight openings in the dome, making an angle of 65 deg. with the horizontal. Each electrode is made up of four pieces of carbon, has a total section of 660 x 660 mm. and weighs 1,300 kg. The average loss in weight by burning away is 5 kg. per ton of iron produced, but to this must be added an equal amount rendered unfit for any further use. Outside the crucible the electrodes pass through copper water jackets. Connection with the cable leads is made by cast-steel terminals, which clamp the cables to the carbons.

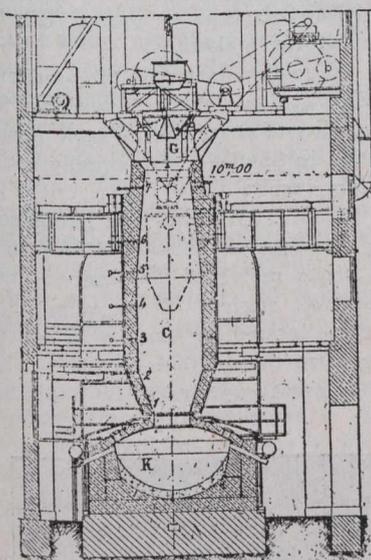


Fig. 1.

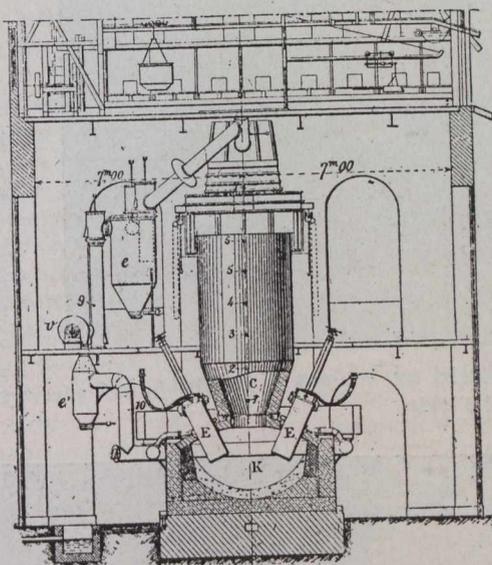


Fig. 2.

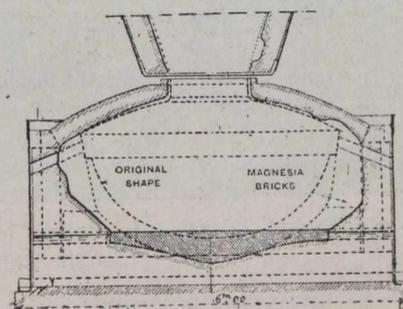


Fig. 3.

A quantity of gas extracted at the throat is drawn through a dust screen by a centrifugal fan, and is blown again into the space which exists between the molten mass and the dome. Four adjustable twyers or nozzles are used to distribute this gas, being arranged at intervals of 90 deg. apart round the crucible. This supply of waste gases into the crucible serves a double purpose: the gases are heated up in the crucible, and give off the absorbed heat as they pass into the upper zones, thus materially assisting the reduction; further, they cool the dome, and thus prevent its too rapid destruction. With gases at 200 deg. C., and containing equal volumes of CO and CO<sub>2</sub>, 70 cb. m. per minute at a pressure of 325 mm. water gauge are blown into the crucible by the 8-h.p. electric fan. There are the usual fittings for drawing off the slag and the iron.

**Electrical Equipment.**—The supply is three-phase at 10,000 volts, and is transformed to two-phase current with a pressure variable in each phase from 50 to 100 volts. From the transformers the energy is led to the furnace by four leads, each lead consisting of six copper strips 200 mm. x 8 mm. in section. Each strip, again, is connected to eight cables, each having 185 sq. mm. section; thus 48 cables having a total section of 8,800 sq. mm. are connected to each electrode.

Electric measuring instruments of various kinds are supplied, including platinum and platinum-rhodium pyrometers.

The current varied between 3,000 and 18,000 amperes, with a pressure variation of between 50 and 100 volts per phase. The power used varied considerably, the load ranging from 300 to 2,000 kw.

**Conclusion and Results.**—Three series of experiments were made by Messrs. Leffler and Nyström, of the "Jern-Kontoret," in the six months referred to, and the results are tabulated below:—

	I.	II.	III.
Number of experiment.....			
Mean primary load, kw. ....	1,319	1,717	1,680
Mean secondary voltage—			
Phase I. ....	65.2	75	81.9
Phase II. ....	65.9	83	88.2
Mean secondary amperes—			
Phase I. ....	13,731	13,564	11,922
Phase II. ....	13,416	11,817	10,406
Kw.-hours per ton cast.....	2,296	2,481	2,241
Kw.-hours per ton cast, useful work .....	1,454	1,686	1,595

Kw.-hours per ton cast, losses	842	795	646
Efficiency, per cent. ....	62.33%	67.96%	71.77%
Losses—			
Transformer losses .....	1.83%	2.74%	2.12%
Secondary losses (including leads) .....	3.31%	3.83%	3.03%
Absorbed by cooling water	6.53%	6.57%	6.53%
Radiation and other losses	26.00%	18.90%	16.55%
	100%	100%	100%
Calorific value of waste gases			
per cubic metre .....	2,786 cal.	2,892 cal.	2,544 cal.
Of this 80% only can be utilized .....	2,230 cal.	2,315 cal.	2,035 cal.
Consumption of charcoal in hectolitres per ton cast..	25.02	23.88	21.66

The average consumption of charcoal in other furnaces is 62.8 hl. per ton.

In conclusion, it is interesting to note that the most serious incident in the six months' work was an explosion in the crucible due to the rapid descent into the molten mass of a quantity of powdered ore which had not been thoroughly dried.