differently constructed furnace, in which the electrode is isolated from the charge, the output might be greatly in-creased by the introduction of an air blast.

The official experiments were begun about the miadle of January, the furnace being in operation night and day, with some few intermissions, until the 5th of March. During that time about 150 casts were made, yielding about 55 tons of pig iron.

The following classes of ore were treated:-

- Τ.
- Hematite (Nagaunee). Magnetite from the Wilbur mine, Ont. (Wm. Caldwell, 2 Esq.). Magnetite from the Blairton mine, Ont. (Pierce Co.,
- 3 Marmora.). 4.
- Magnetite from the Calabogie Mining Co. (J. G. Camp-Magnetite from the Calabogie Mining Co. (J. G. Campbell, Esq., Perth.).
  Magnetite from the Calabogie Mining Co. (J. G. Campbell, Esq., Perth.).
  Magnetite from the Calabogie mine (T. B. Caldwell, Esq., Lanark.). 5.
- 6.
- Roasted pyrrhotite from Lake Superior Corporation. Titaniferous iron ore from Quebec. (J. G. Scott, Quebec.). 8

The materials for the charge: ore, flux and carbon, were crushed to pass through a  $\frac{34}{7}$  ring and roughly mixed. The composition of the charge in each run as given in this pre-liminary report was slightly modified from time to time by varying the percentage of charcoal and flux.

#### \*Run No. 8.

Ore	treat	ted		 				 	•					. Hematite.
Redu	icing	ag	ent					 		•	 			. Briquettes.
Flux				 	 							 		Limestone.

\*\* Analysis of Raw Material.

Hematite:		Limestone:	
SiO <sub>2</sub>	5.42	SiO <sub>2</sub>	
Fe <sub>2</sub> O <sub>3</sub>	38.90	$Fe_2O_3 + Al_2O_3 \dots 0.81$	
$Al_2O_3$	2.51	CaCO <sub>3</sub>	
CaO	0.61	MgCO <sub>3</sub> 4.40	
MgO	0.30	P 0.00	4
Mn	0.16	S 0.05	2
P	0.044	We devider to Internet	_
S	0.002	99.82	6
Loss on ignition	2.48	of actional arrive during	-

100.426

Per cent.

Metallic iron . ..... The briquettes were made of 80 per cent. coke dust and 20 per cent. fireclay. Briquettes:

	Per cent
Volatile matter	4.05
Fixed carbon	69.73
SiO <sub>2</sub>	15.26
$Fe_2O_3 + Al_2O_3$	8.92
CaO	0.90
MgO	0.30
5	0.84

100.00

The charge, which was slightly modified for subsequent charges by increasing the amount of briquettes and decreas-ing the limestone, had the following composition:—

																		T	1	oui	10:	s.
Ore											•			 						20	00	
Briquettes															 					(	50	
Limestone	1							1.													50	

## Analysis of Iron Produced.

Cast No. 28, Grey Iron:	Cast No. 30, Grey Iron:
Total carbon	4.85 4.35
Si	0.87 1.03
S	0.018 0.019

### Analysis of Slag Produced.

$SiO_2$ .																			 		 			34.40
$Al_2O_3$																 			 . ,					15.73
CaO.																								43.53
MgO	•			•			•		•		• •			•										2.00
Fe		• •	•	•	•	• •	•••	•	•	•					•			•		•		 		1.35
S																 					 	 		0.55

#### slag (obtained) 1162

-= 0.44 iron (obtained) 2665

\*Only those runs are given in this preliminary report which are of special interest. \*\*A redetermination for the final report of the composition of slags and iron produced renders the analyses here given subject to amendment.

Length of run	12 hours.
Mean volts on furnace	38.5
Mean amperes	4850
Power factor	0.919
Pig-iron produced	2065 lbs.
Watts = $38.5 \times 4856 \times 0.919$	171812
171812	
Electrical horse-power $=$ $=$ 230.3	

746 Output of pig-iron per 1,000 E. H. P. days = 2665 × 24 × 1000

- = 11.57 tons.

 $12 \times 230.3 \times 2000$ E. H. P. years of 305 days per ton of pig = 0.236

Subsequent experiments indicate that had charcoal or coke been used as a reducing agent instead of briquettes, thereby greatly reducing the amount of slag produced, the output would have been considerably increased.

### Run No. 13.

Ore treated ......magnetite from Wilbur mine. Reducing agent .....charcoal. Flux . .....sand.

Wilbur Ore:	Charcoal:	Per cent.
Per cent.	Moisture	14.06
$SiO_2$ 6.20	Volatile matter .	28.08
$Fe_2O_3 \dots 55.42 Fe = 55.42$	Fixed carbon	55.90
FeO 23.04	Ash	2.54
AlO 2.56		and the second
CaO 2.00		100.58
MgO 6.84	Sulphur	0.058
$P_2O_5$ 0.023 $P = 0.01$	Station of the Transfer	
S 0.01		
$CO_2$ & undet 3.907		

100.000

The sand used was common furnace sand, of which no analysis was made.

# Composition of Charge.

~																							1	ounds.
Ore	 	-										 												400
Charcoal												 			• •	0								125
Sand	• •	•	•	•	• •		•	•	•	•	•	 •	•	•		•	•		• •		-	• •		27

### Analysis of Iron Produced.

Cast No. 49, Gre	y Iron:	Cast No. 53, Grey	Iron:
Total carbon		5.18	. 4.65
Si		I.30	. I.4I
5		0.020	. 0.012
Ρ		0.020	0.024

# Analysis of Slag Produced.

C:O	-
5102	35.84
$Al_2O_3$	31.80
CaO	14 20
MαO	14.39
MgO	10.22
<u>D</u>	0.20
Fe	0.35
Slag 4195	00
= = 0.326	
Iron 12858	
Length of run	min
Mean volts on furnace 35.75	, 11111.

Mean amperes 5000
Power factor
Pig-iron produced 12858 pounds.
Watts $=35.75 \times 5000 \times 0.919164271$
164271
E. H. P.== 220.2
746
Jutput of pig-iron per 1,000 E. H. P. days =
12858 × 24 × 1000
$67.4$ $\times$ $67.4$ $\times$ $11.4$ $1$ tons.

E. H. P. years\* per ton of pig = 0.2399.

### Run No. 14.

Ore treated	Magnetite	from	Blairton	mine.
Reducing agent	harcoal.	0		
Flux	Sand.	с.		

\*36; days.