in the iron ore and some of the metalloids in the iron. In three hours it was possible to elimidate ninety per cent. of the phosphorus in the primary furnace, while owing to the comparatively low temperature seventy per cent. of the original carbon was left in the metal.

At this point the primary furnace is tapped into the secondary furnace and the phosphoric slag removed. A brisk carbon boil commences at once in the second furnace and continues for three hours, when a very superior metal is obtained.

As in the Talbot process a considerable quantity of oxide of iron is reduced and Mr. Bertrand obtains one hundred to one hundred and three units of finished steel from one hundred units of steel making material. By neither process is it possible to work up a charge similar to a pig and scrap charge. It is stated with regard to the Talbot furnace that a company has been formed in England with a capital of £300,000 styled "The Talbot continuous steel process," and arrangements have already been made with several English steel makers for introducing the process.

With regard to the Bertrand-Thiel process it is announced that the British patents have been acquired by the proprietors of two leading steel works who are now granting licenses. Referring to the relative cost of the ordinary basic open hearth process and the Bertrand practice with basic pig at the present value (Aug.) in England. In ordinary practice with seventy per cent. pig and thirty per cent. scrap, one hundred and seven and-a-half tons are required to make one hundred tons of ingots, costing about £5 2s. 6d. per ton. In Bertrand practice with seventy per cent. pig and thirty per cent. scrap, one hundred tons will produce one hundred and two tons of ingots, costing £4 5s., a saving over ordinary practice of 17s. 6d. per ton.

It is claimed that a pair of fifty-ton furnaces on the Bertrand system will produce two thousand one hundred to two thousand four hundred tons of metal per week. The slag from the first furnace contains twenty per cent. of phosphorus and is valuable as a fertilizer. Such, then, is the present position of the Siemens Open Hearth process, which by improvement in the design of the original furnace and by improvements in the original process will most probably have an effect on the relative positions of the two great rival steel-making processes.

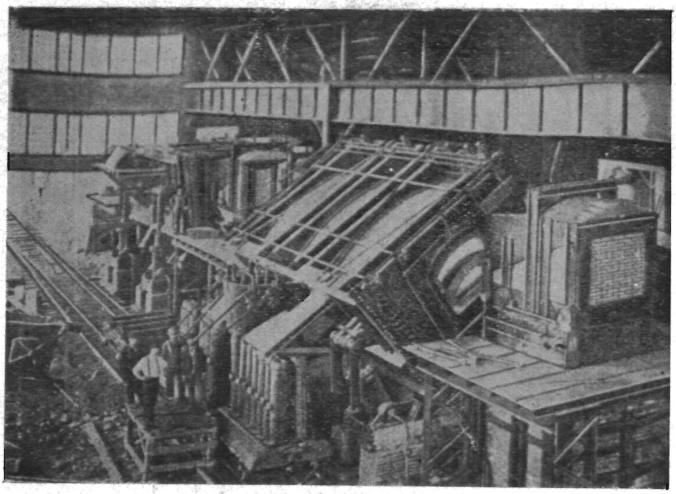
In the light of these inventions and improvements, the Siemens Open Hearth steel process will most probably play a more important part than the Bessemer process in the steel manufacturing industry of this country, which present indications seem to show will before long be established.

Another most important factor which will determine which steel-making process is to be adopted eventually in New South Wales, is one of necessity and not of choice, and that is the nature of the pig iron produced from local iron ore deposits. All, or nearly all, the iron ore deposits of this colony are phosphoric to such an extent as to produce a pig iron containing from ·1 per cent. to 1 per cent of P. and so from necessity if we are ever to manufacture steel from pig iron produced from smelting our own ores, it will have to be by the basic Siemens process, which process, however, in the light of the latest improvements of Messrs. Talbot, Bertrand and Thiel, will produce a best quality steel at a low cost.

Of course there is the other alternative of making steel by the Bessemer process from pig iron, made from pure imported ores.

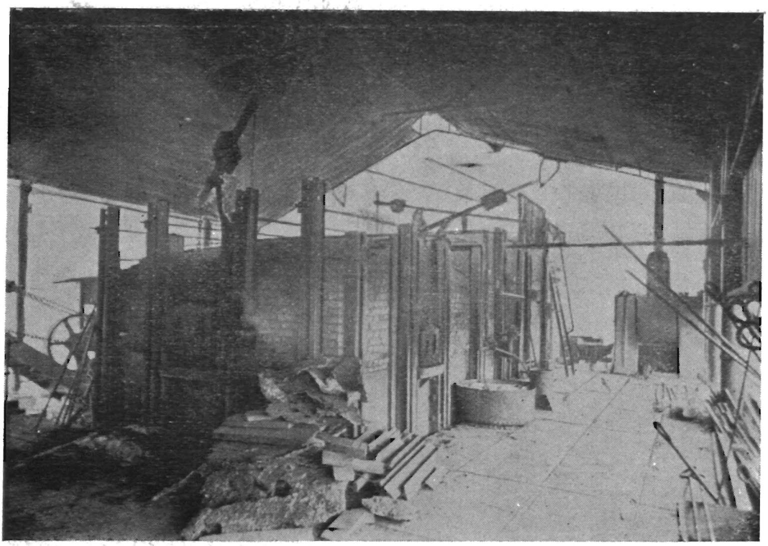
In conclusion I should like to make recognition of the assistance and courtesy extended to me by Mr. John Sandford, during his father's absence in England, in giving me assistance and access to all data relative to the steel furnace at Lithgow with which this paper mainly deals.

I.



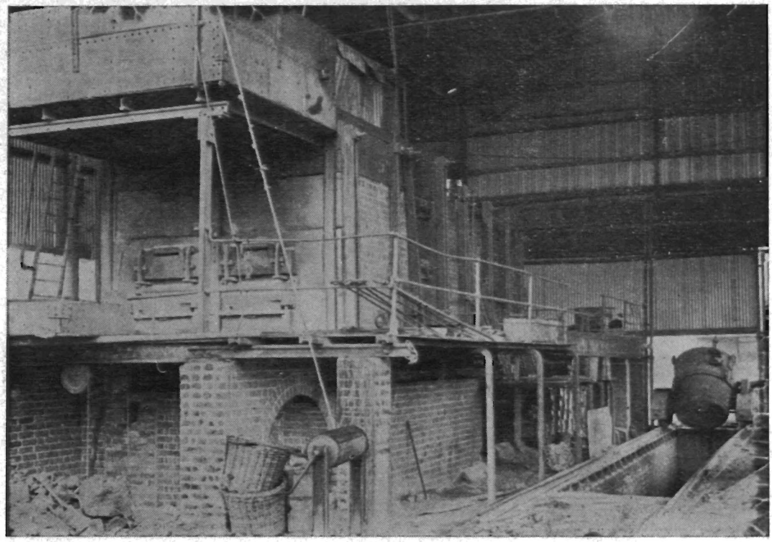
Siemens Tilting Furnace.

II.



"New Form Siemens" Furnace, Lithgow.
Figs. II., III. and IV.

III.



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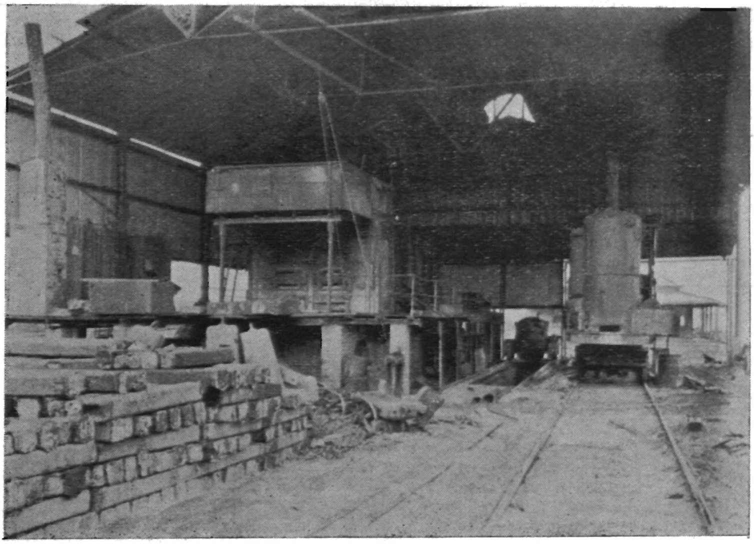
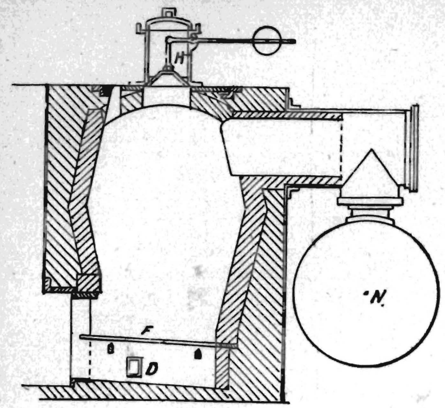


Fig. I.

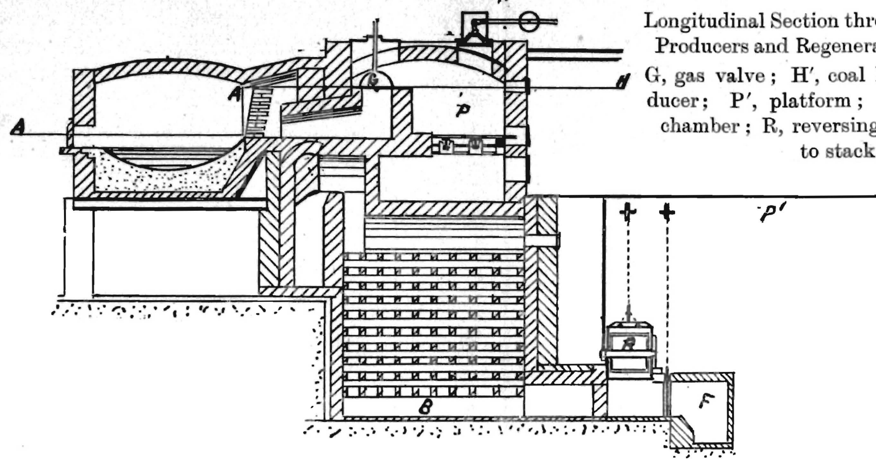


Vertical Section through centre of Wellman Gas Producer.

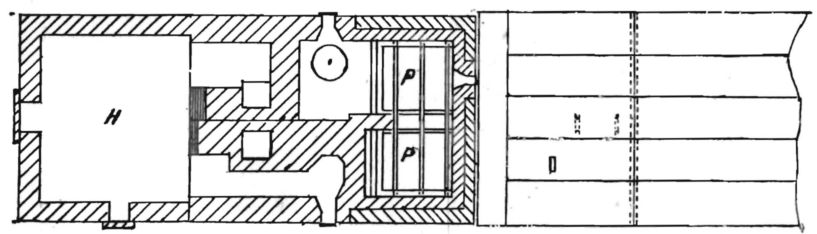
H. coal hopper; F, grate bar; D, steam blower; N, gas main.

Fig. V.

Siemens Furnace, Lithgow.



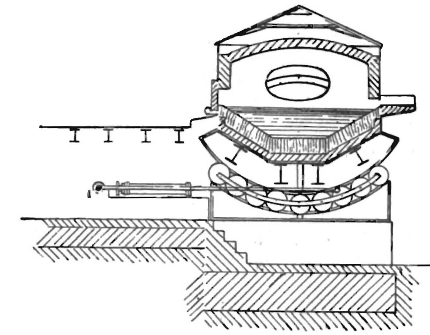
Longitudinal Section through the Hearth, Producers and Regenerative Chambers.
G, gas valve; H', coal hopper; P, producer; P', platform; B regenerative, chamber; R, reversing valve; F, flue to stack.



Section on the line A.A.A. H, hearth.

Fig. IV.

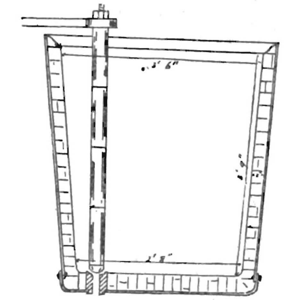
Siemens Tilting Furnace.



Cross Section.

Fig. VII.

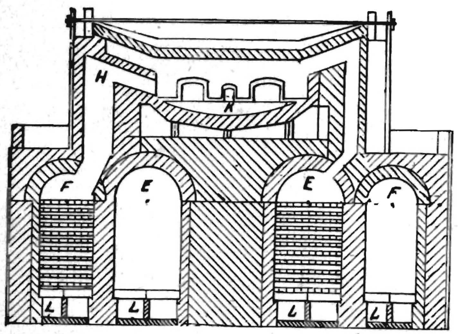
Siemens Furnace, Lithgow.



Cross Section of Ladle for holding steel tapped from furnace.

Fig. II.

Siemens Furnace (ordinary type).
Longitudinal Section through centre of furnace.



H, gas port; F, F, gas chambers; E, E, air chambers; L, L, flues to valve.

Fig. III.

Cross Section through centre of Hearth and Air Chamber.

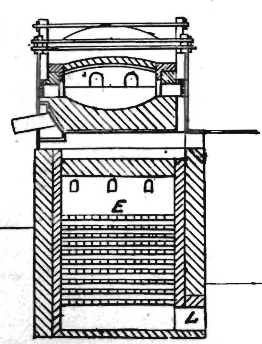
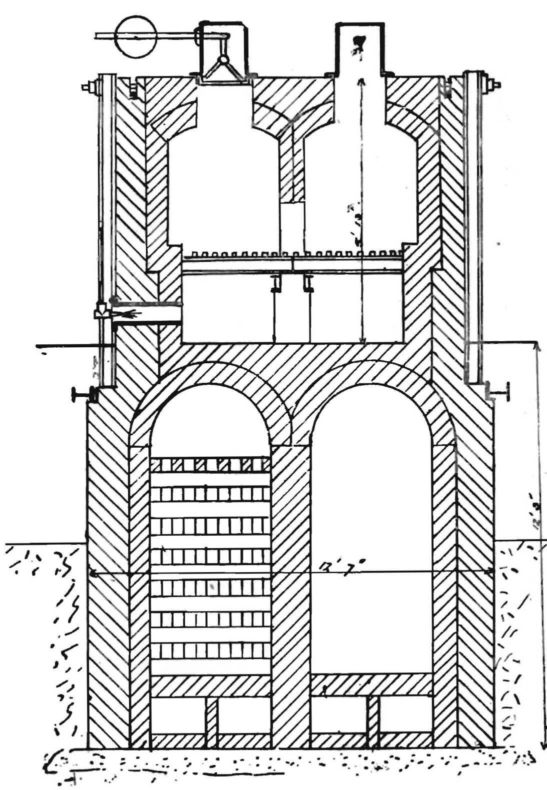
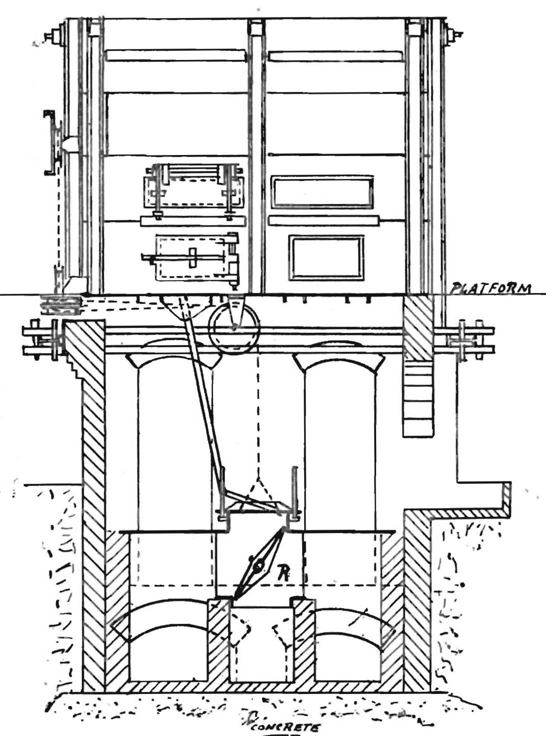


Fig. VI.

Siemens Furnace, Lithgow.



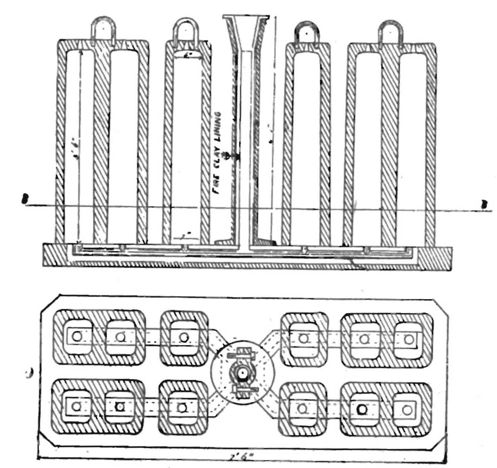
Cross Section through Producers and Regenerative Chambers.



Cross Section through Reversing Valve.
R, reversing valve.

Fig. VIII.

Siemens Furnace, Lithgow.
Vertical Section.



Section on line B.B.
Arrangement of moulds for filling from below.