from the furnace. This is not difficult to obtain, samples of the gases being collected at suitable places in the flues and the analysis made by means of one of the many forms of rough apparatus used for that purpose.

On analyzing the products of combustion they will be found to consist of the following constituent gases:

Carbon dioxide or carbonic acid gas (CO_2) from the carbon of the coal and the oxygen of the atmosphere. There is found to be 17 per cent. to 5 per cent. of this gas present. These are extreme figures, the more usual ones being from 12 per cent. to 7 per cent.

Free oxygen (O). There is usually from 12 per cent. to 4 per cent. of this gas.

Carbon monoxide or carbonic oxide (CO). From 2.5 per cent. to none. In very many boilers working fairly economically, the quantity of this gas which can be detected by the usual means is none.

Unburnt hydrocarbons. These are in small quantities and not found by the ordinary analysis, but they often exist and must be a source of loss.

The last gas in the flue gases is nⁱtrogen (N), which is found by difference, and the sum total of these subtracted from 100 and the remainder assumed to be wholly of nitrogen, usually there is 80 per cent. of this gas present.

It is clear, then, any excess of air in the flue gases results in heat being carried away to the chimney and so wasted; and, on the other hand, a deficiency in the air supply is a cause of a loss on account of the fuel being incompletely burnt and the escape of the carbon monoxide without being burnt.

Chairman,-

The paper is now open for discussion, and if any of the gentlemen present would like to ask any questions, Mr. Bly, I am satisfied, will be pleased to answer them.

Mr. Jas. Kelly,-

What do you consider is a reasonable temperature in the chimney over the top of the boiler?

Mr. G. D. Bly,-

About 500° to 550° ; if you have 600° , you are getting a loss, and your draft should be checked.