

## COMPOSITION OF PRODUCER GAS.

Carbon Dioxide $C O_2$ .....	5%
Carbon Monoxide $C O$ .....	24%
Hydrogen .....	3%
Nitrogen .....	68%

The charging and clinking doors on the furnaces are air tight and the primary air is admitted under the fire bars and is usually preheated. The combustion of the carbon (in the coke) combined with the oxygen of the primary air produces carbonic acid gas ( $CO_2$ ) and in passing through the upper portion of the coke fuel it becomes converted into Carbonic oxide gas ( $CO$ ).

It then passes through nostrils into the combustion chamber as producer gas, here it meets a stream of highly heated secondary air (that has been admitted at the bottom of the furnace, and zig zags through the tubes heated by the spent gases to a temperature of about 1,800 F.). At the meeting of the producer gas and secondary air, combustion is formed. After doing their duty in heating the retorts, the gases descend through the flues or regenerators (heating the secondary air in their journey) into the main flue to chimney. Below is a table of the composition of flue or spent gases.

## COMPOSITION OF FLUE OR SPENT GASES.

$C O_2$	15 or 16%
O	not more than 2%
Nitrogen	80 to 82%
$C O$	Trace

You will quite see by this system a considerable saving of fuel, owing to the regular heats affected, and a saving in that department alone can be made of about 50% over the direct fired type.

We will now trace the gas as it leaves the retort up the ascension pipe and into the hydraulic main by way of the dip pipes. These are shown sealed in the liquid contained in the main to prevent the gas getting back in the retort when the lid should be open for charging. The liquid is kept at one level by means of a weir overflow valve. The thick tar, as fast as it forms, falls to the bottom by reason of its high specific gravity, and is constantly flowing away in a downward direction into the tar and liquid well, from where the gas flows into the foul main. It is in these two mains the gas first receives its purifying process, for the cooling effect of the liquid in contact with the gas flowing into the mains, tends to condense the liquids or to break up the larger liquid globules and release the gas.

The gas in the retorts is at a slight pressure, about 5-10" or .018 pounds to the square inch. Should it exceed this, the