to dispose of their gas in bulk to townships at the price named.

The Utilization of Coke Oven Gas for Power Development.

The writer has had no personal experience of very large gas engines running on coke oven gas, but desires to point to the rapid development in this direction which has taken place in recent years in Germany. It is true that the application of coke oven gas for this purpose is not so extensive as has been the case with blast furnace gas, but this is mainly for the reason that coke oven plants are set down as a rule at collieries, where the domestic need for power is not so great as at ironworks, where often big developments are in progress. The high percentage of hydrogen in coke oven gas is often alleged as the reason for the non-development of this branch of coke-oven possibility, and true it is that coke oven gas engines have to be run on lower compression than is the case with blast furnace gas. Nevertheless, this drawback has not debarred German engineers from utilizing coke oven gas wherever expedient. The Augsburg-Nurnberg firm alone has 49 engines, averaging 1.290 b.h.p., or a total of 63,270 b.h.p., employing coke oven gas solely. These engines, representing a capital expenditure of from £350,000 to £400,000, may surely be said to have placed coke oven gas for engine use beyond the pale of risky experiment. One firm, the Eschweiler Bergwerks Verein, has increased its installation step by step as follows:

2 Engines,	520 b.h.p.	=	1,040 b.h.p.
2 Engines,	1,110 b.h.p.	=	2,220 b.h.p.
1 Engine,	1,160 b.h.p.	=	1,160 b.h.p.
2 Engines,	2,330 b.h.p.	=	4,660 b.h.p.
2 Engines,	2,660 b.h.p.	=	5,320 b.h.p.
			Total 14,400 for one station.

This should be sufficient proof of the practicability of coke oven gas driving.

Messrs. Enrhardt & Sehmer have erected 15 engines, developing a total of 17,980 b.h.p., all of which are running on coke oven gas, and at Heinitz, one of their stations, 7 engines are at work developing 11,000 b.h.p. At this latter plant, the annual average gas consumption is 0.57 cubic metres per b.h.p. hour, the composition of the gas being as follows:

CO_2	2.8%
O_2	1.0%
CO	7.6%
Unsaturated Hydrocarbons	3.7%
H_2	50.3%
CH_4	24.9%
N_2	9.7%

On this basis a modern regenerative coke oven plant carbonizing 400 tons of coal per day, would be capable of developing 5,000 b.h.p. Even by supposing only a yield of 50 per cent. surplus gas, and 25 cubic feet per b.h.p. hour, the total power output would be 3,300 b.h.p. for a plant of this size.

The writer believes that a large number of the troubles entailed in the use of coke oven gas, over and above those dependent on engine design, have lain in the want of thorough preparation of the gas before use.

The removal of tars and naphthalene, both of which produce valve troubles, is readily effected by a combination of modern tar extractors in the first instance, and by anthracene washing in the second (the latter being simultaneous with the removal of benzol). The sulphuretted hydrogen which would burn to SO_2 producing corrosion in a heavily water-cooled engine, may be removed either by the usual box-purifier containing oxide of iron, or by Burkheiser's method previously described. Apart from the purification itself, it is of advantage to remove the sulphuretted hydrogen from the gas for the manufacture of the sulphuric acid required by the sulphate of ammonia plant, so that the removal effects a double end. The maximum amount of tar allowed in the gas in German practice is 0.72 grm. per cubic m., and total sulphur 0.3 grm.

The Use of Coke Oven Gas for Furnace Heating.

The employment of coke oven gas mixed with blast furnace gas or producer gas, for the heating of smelting furnaces, is yet in its infancy, but the possibilities in this direction of a large iron and steel plant with by-product coke oven batteries as auxiliaries are not to be denied. If it is assumed that such a plant depends for its power on gas engine development throughout, it is quite within the bounds of probability that surplus gas will be available from both blast furnaces and coke oven plant, which, in the absence of town's gas schemes, would be available for furnace heating. To some extent this is already being done at Kattowitz, in Upper Silesia, where a mixture of coke oven gas and producer gas has been employed since 1906, with large economies in producer coal as a result, and Krupp's have recently adopted the Kattowitz method.

A mixture of three parts blast furnace gas and one part average coke oven gas would pan out as follows:

CO_2	9.0 %	
CO	22.75%	
H_2	13.25%	
CH_4	7.50%	
C_2H_4	.50%	(C_6H_6 having been removed from the coke oven gas).
	44.00%	Total combustibles.

the calorific value being 260 b.t.u. Average producer practice would give a gas between the following limits:

CO_2	=	3 to 6%
CO	=	22 to 28%
H_2	=	9 to 14%
CH_4	=	2 to 3.5%

or a calorific value of from 125 to 175 b.t.u. Say from 33 per cent. to 44 per cent. total combustibles. The only point in which the composite gas would be lacking would be the tars and soots which ordinarily pass over with the producer gas into the furnace. The calorific value of the tars is equal approximately to 11 b.t.u. per cubic foot of gas, thus raising the calorific value of best producer gas to 186 b.t.u. per cubic foot. This addition, however, does not increase the calorific power of best producer gas to the calorific power of the composite gas given, so that the loss of the tars in the latter are not of moment from a calorific standpoint. It may be objected that the absence of the tars might render the composite gas less luminous and more difficult to control in the furnace, but the writer would point out that washed Mond gas is successfully being used for furnace heating. It is also probable that when the composite gas is highly regenerated its high content of CH_4 with the small amount of ethylene it contains, would render the flame sufficiently luminous for its easy control.