Editorial & Publishing Offices:
MACMILLAN & CO., LTD.
ST. MARTIN'S STREET
LONDON, W.C.2

Telegraphic Address:
PHUSIS, LESQUARE, LONDON

Telephone Number:
WHITEHALL 8831

Vol. 142 SATURDAY, SEPTEMBER 24, 1938 No. 3595

Progress in the Gas Industry

THE majority of our large industries can claim to-day to be well managed. Two major depressions since the Great War and the need of continuous adjustment to changing world conditions, including the altered views towards labour at home, have provided a stimulus to which even the most conventional and conservative have been forced to react. The more successful industries are those which have favoured research both into new processes and to bettering existing practice. In the steel industry, for example, every time a new plant is erected—and there have been several in recent years—it represents all the most modern views with the addition generally of something new, peculiar to the particular plant. If successful, this novelty is copied in the next plant, though others in the industry can only benefit when the next new plant is built. Such an industry must bear a very high rate of depreciation if it is to replace its plant at reasonable intervals, and it has to solve some very difficult financial problems. In certain industries the amount of capital locked up in a particular type of plant is large, so that a new development which involves the scrapping of this plant whilst it is still in first-class condition is looked at askance.

Whilst it is the prime duty of management to carry on a business as it exists, seeking any and every way of increasing efficiency in all departments, nothing is lost by occasionally reviewing the possibilities in quite other directions than what is normal practice. Whilst competition should be enough to keep industrial firms alert, the great public utilities might conceivably stagnate without the pressure of public opinion.

Probably the most discussed event of the year in the gas industry is a paper by Mr. E. V. Evans, who is chairman of the Research Executive Committee of the Institution of Gas Engineers, in which views are advanced regarding the processing of coal which involve a great departure from existing practice. Inasmuch as coal is both the chief raw material and main source of political and social controversy in Great Britain, whilst each one of us is concerned in the problems of cooking and heating, it is of interest to enlarge a little on this subject.

Two large industries carbonize coal—the gas industry, which makes gas the prime and coke a subsidiary product and also undertakes the supply of gas to every room in every house, and the coke oven industry, which makes coke for the metallurgical industries and sells gas as a by-product when possible.

The Area Gas Supply Committee under the chairmanship of Sir Alexander Walker advocated in 1930 that by means of a system of ring mains this oven gas should be collected from the coke ovens and distributed by the gas companies. The city of Sheffield has adopted this practice with success, though more recently both the Lords and the Commons have given an attentive ear to the opposition of vested interests to a proposed scheme elsewhere in Yorkshire promoted by the gas companies. This incident is both regrettable and short-sighted ; it is imperative, to conserve our national resources of coal, that all gas produced at coke ovens or oil refiners should be distributed through the mains of gas companies. In the United States there are many thousands of miles of pipe line serving this purpose.

The purpose of a gas company is to supply gas, and its capital and expenditure is almost entirely devoted to this. The sale of the by-product

brought in a casual income which has been supplemented and made more regular since the industry has turned to perfecting at considerable cost the quality of coke, both in regard to size, moisture and ash content and burning qualities. In addition, the apparatus in which coke is used has been perfected so that the public is getting to use and to rely on it more and more, causing a demand for it in the colder months which roughly balances the production by the gas industry.

Mr. Evans has drawn up an illuminating balance sheet on *a thermal basis* of the gas industry. 300 therms are purchased in the form of coal for 25*s*., that is, 1·00*d*. per therm by a works some distance from the collieries, and a further 150*d*. is spent on manufacturing costs exclusive of capital charges. 72 therms are used during the process, so that the cost per therm of the products is 450/228 = 1·97*d*. per therm.

There are three products, namely, 75 therms of gas, 135 therms of coke, 18 therms of tar. The coke sells at the works at 1*d*. per therm (a working loss of 0·97*d*.) and the tar at 1·85*d*. per therm, a loss of 0·12*d*. on each therm. If these losses are computed per therm of gas they amount to 1·78*d*., making a total manufacturing cost for gas of 3·75*d*. per therm into the holder ready to be distributed. If gas is to hold its own in the future it should be cheaper, particularly if it is to serve—as it should—as a staple fuel and not a luxury commodity. The industry in such circumstances will no longer be in a position to afford the continued production of coke; the public with cheap gas as a staple fuel will not need coke as a complement. Further, if gas exclusively is used in a household for which purpose the existing supply mains are adequate, the distribution costs will be decreased.

This economic survey leads to the consideration of the technical problem of the complete gasification of coal. The gas must be low in carbon monoxide and contain enough hydrocarbon gases to give it the calorific value and combustion properties which now characterize it. A new process has to be invented, and Mr. Evans described the experimental work which has led to most hopeful results; these are soon to be tested on a large scale in a specially designed plant. They are based on the discovery that large yields of methane are obtained by the direct hydrogenation of coal under pressure as it is undergoing decomposition whilst its temperature is being raised from 550° to 800° C. The production of the necessary hydrogen at a low cost is based on an earlier discovery by the Lurgi Company that coal gasified under pressure in the presence of steam and oxygen with a high proportion of the former yields a gas rich in hydrogen.

The technical details need not concern us. The picture is one of coal being charged into a vessel where it will be treated with hydrogen under pressure in such a manner that it will produce rich gas together with primary tar. When rather more than half the weight of coal has gone, the rest is fed to a producer, operating under pressure and supplied with oxygen and steam, where it is gasified to produce hydrogen. Such a works would be very much smaller than the modern gasworks; purification being done by washing under pressure would be simple, and there would be other advantages. It would, however, be entirely different from the gasworks of to-day.

The gas industry has enterprise and public spirit enough to carry through the experiment; it will take time and treasure. If it succeeds, the day will be nearer when all our heat is on tap, the streets free from carts delivering coal and coke, the skies free from smoke and our houses cleaner and more convenient.

Oxford Essays on Evolution

Evolution:
Essays on Aspects of Evolutionary Biology presented to Prof. E. S. Goodrich on his Seventieth Birthday. Edited by G. R. de Beer. Pp. viii + 352. (Oxford: Clarendon Press; London: Oxford University Press, 1938.) 15*s*. net.

FOR close on half a century, Prof. E. S. Goodrich has been engaged in zoological research and teaching in the University of Oxford. On the recent occasion of his seventieth birthday a congratulatory volume prepared by a number of his colleagues and pupils was presented to him. Instead of following the usual method of such *Festschriften* and allowing the contributors to write on any subject they might choose, the editor, Dr. G. R. de Beer, decided to prepare a planned volume on the more important aspects of modern knowledge concerning evolution. He secured the