

are dealt with in chaps. v. to x. The work done on vanes, and water-wheels and turbines take up the following three chapters, and the book closes with chapters on naval hydromechanics, pumps and pumping. The space devoted to the flow of water is large by comparison, and includes, in addition to the usual subjects, the flow through fire-hose and in fountains. Biel's formula for the flow in pipes and channels is discussed, and results calculated from it are compared with those given by Kutter's formula. The treatment of this section is adequate and good.

The book contains many illustrations, mostly outline diagrams, and while these illustrate very well the principles discussed, the inclusion of a larger number of working drawings would have been better. This remark applies particularly to the sections dealing respectively with turbines and pumps; the latter has no working drawings whatever, and both sections could bear considerable expansion. Hydraulic machinery is dismissed in three and a half pages, with four inadequate sketches, regarded from the point of view of the student who desires to know how the appliances are actually constructed.

Throughout the entire volume there are copious references to articles in periodicals, other books, transactions of societies, etc.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

A Plea for the Fuller Utilisation of Coal.

THE suggestion in your article of July 26 on the Fuel Research Board of "the employment of coke-oven gas to supplement the output of suitably situated gas works, and the more extended use of water-gas," is timely, and it certainly does not err on the side of excess.

As pointed out in a paper which I read before Section G of the British Association in 1906, "if all the foundry coke which is used in this country were made in by-product recovery ovens, the resulting yield of gas would be more than 160,000,000,000 cub. ft. per annum, or more than is used in one year in the whole of the United Kingdom"; and, as regards the distance to which the gas might be conveyed, it is scarcely an exaggeration to say that the economic limit of supply is the coast-line of Great Britain.

The possibility of conveying gas over long distances is scarcely realised in this country, although in the United States gas has for many years past been piped at high pressures over hundreds of miles.

The need for a cheap supply of power is beginning to make itself felt. Not unnaturally we turn to electricity; but over long distances gas is a very formidable competitor.

The question of fertilisers is also attracting attention. For years past we have been spending something like 15,000,000l. per annum on importing nitrate of soda from Chile, and wasting an equivalent amount of nitrogen by our primitive methods of using coal.

We are beginning, too, to realise the importance

of the great coal-tar industry which we have allowed to slip into German hands.

In every direction we are confronted by problems which depend for their solution on a fuller utilisation of our great national asset.

The burning of coal in its raw state was long ago denounced by the late Sir William Siemens as "a barbarous practice"; but habit is strong, and our business men have been too busy making money to give much thought to economy in power production.

Recent events have violently jolted us out of our ancient grooves, and there is now a disposition to consider novel proposals on their merits.

I showed in a paper read before the Society of Arts in March, 1906, that coal-gas made at the pit's mouth could be delivered in London at a price at which it would oust coal from the home and from many industrial processes. My proposals may be briefly summarised as follows:—

(1) The whole of the coke-oven gas now wasted would be utilised, and a part of the additional gas required generated from small coal at the pit's mouth by the ordinary method of carbonisation, but without regard to illuminating power.

(2) The waste heat from the retorts would be utilised to raise steam for compressing the gas.

(3) The exhaust steam would be used to generate water-gas.

(4) The gas would be piped to wherever required, and delivered under sufficient pressure to charge the storage cylinders of motor vehicles.

(5) Chemical works would be established near the collieries to deal with the ammonia, tar, etc.

In this way practically the whole of the available heat of the coal would be turned to account, instead of wasting some 90 per cent. of it, as is done in generating electricity by steam-power; and the residuals, the whole of which are wasted when coal is burnt under a boiler, would be turned to good account.

The question bristles with points of scientific interest, but I have already trespassed long enough on your space and on the patience of your readers.

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Devitrification of Quartz Glass.

IN an article by Audley, published in the Transactions of the Ceramic Society, vol. xvi., part i., p. 124, it is stated that the addition of zirconia to fused quartz gives a product resembling quartz opaque glass, but in many respects superior to quartz glass, and less easily devitrified.

The statement is repeated in the article on the uses of zirconia in the issue of NATURE of July 5, and had previously found its way into much of the literature dealing with quartz glass. The alleged superiority of quartz glasses containing zirconium or titanium oxides is due to some experiments carried out by Thomas in the laboratory of Borchers at Aachen, and published in the *Chemiker Zeitung* in 1912. These experiments were shown by me (*Chem. Zeit.*, 1913, p. 589), and independently by others, to be untrustworthy, quartz glasses containing zirconium and titanium oxides being, in fact, more liable to devitrification than quartz glass prepared from pure silica. The purer the quartz glass is the less is its tendency to devitrify after prolonged exposure to heat. Quartz glass manufacturers in this country are well aware of this, and endeavour to produce a material as free as possible from all impurities.

A. C. MICHIE.

The Wallsend Laboratories,
Wallsend-on-Tyne, August 7.