

"SMOKE PREVENTION."

A PRACTICAL EXAMPLE.

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THE following paper is based upon an experiment, conducted over a period of a year, to prevent smoke nuisance caused by the boiler furnace of an infectious diseases hospital.

Cause of the Nuisance.—Early in 1909, a new boiler was installed at Knightswood Hospital (the infectious diseases hospital of the Burgh of Partick). The stack in connection with the furnace is only 40ft. in height. In certain directions of the wind, the smoke nuisance at three of the wards was very obvious. In fact

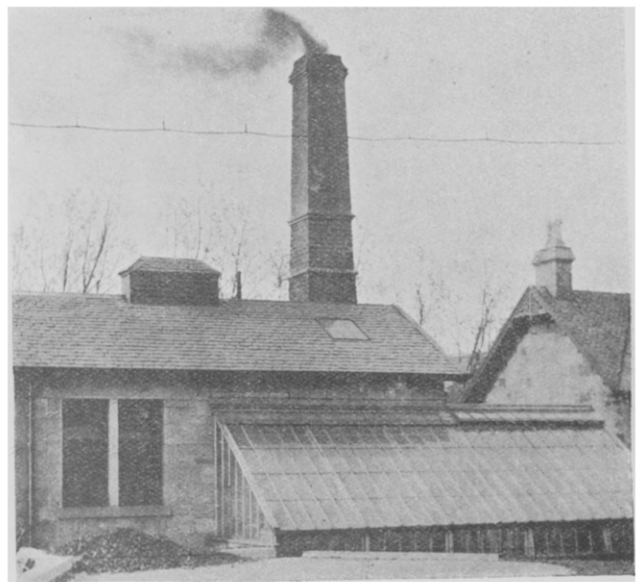
and coke would at least diminish the output of smoke. This suggestion was carried into effect, and continued until March, 1911. It was then discovered that the mixture of fuel, while it had to some extent diminished the smoke output, had unduly injured the fire bars. Since that date therefore, coke alone has been used, and as a complete year has elapsed I think some observations upon the results achieved are justifiable.

The former smoke nuisance has been completely removed, and the following photographs demonstrate this better than words.

Thus No 1 taken immediately after stoking with nuts, shows a large quantity (typical of the circumstances ruling formerly) of black



PHOTOGRAPH NO. 1.



PHOTOGRAPH NO. 2.

if the windows of these wards were open at such times, the atmosphere inside was most objectionable.

Description of Boiler, etc.—Marine type, 8ft. inside diameter, and 8ft. long; furnace, Deighton's withdrawable; working pressure, 50 lbs. (from 6 a.m. to 6 p.m.); steam is supplied to the laundry and to the disinfecter.

Method of Preventing Smoke Nuisance.—During 1910, some consideration was given to the question of increasing the height of the furnace stack as a means of achieving this end. It was suggested, however, by a member of the committee, that a mixture of equal parts nuts (pieces of coal averaging about $\frac{1}{2}$ -inch)

smoke issuing from the stack; No 2 is taken 20 minutes after stoking with nuts, and shows little diminution in the quality of the smoke; it might be added that only after an interval of 40 minutes was there any marked diminution in the amount of black smoke; No 3 is taken immediately after stoking with coke, and it fails to show any visible smoke; No. 4 is a photograph of a portion of one of the wards towards which smoke (nuts in use) is blowing. As the smoke is passing about half way between the ward and the camera, it is not in focus, but one can easily see that considerable blurring of the picture is caused by it between the points marked x . . . x.

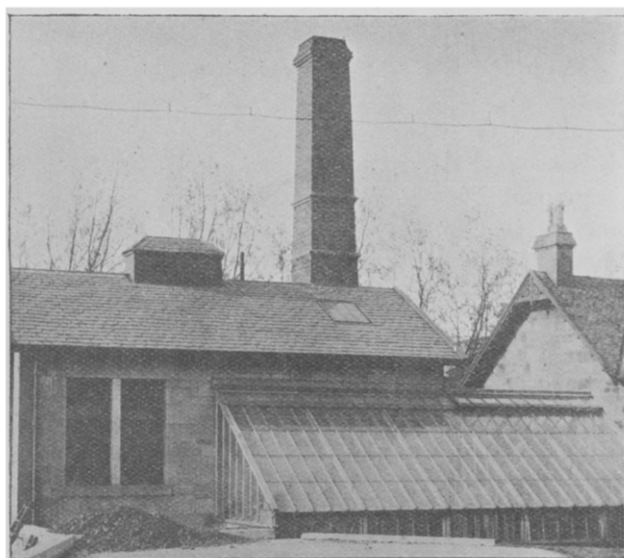
Cost.—Probably the best manner in which to express this is to give the amount in weight of nuts and coke consumed over a period of one year each. Taking the year 1909-10 (when nuts alone were in use as fuel), the quantity consumed was 236 tons, or an average of about $19\frac{3}{4}$ tons per month; while from April 1911 to March, 1912 (coke alone in use), 222 tons or an average of about $18\frac{1}{2}$ tons per month were consumed. Owing to fluctuation in the market values, and also the variation in prices in different districts, an accurate comparison of the cost of these materials is fallacious, but it may be stated that in the present instance, the contract price for nuts was 10s. 6d. per ton, and for coke 11s. 6d. 236 tons of nuts cost

working the tonnage of nuts and coke was very similar (a difference only of 14 tons), the above calorific values are of special interest.

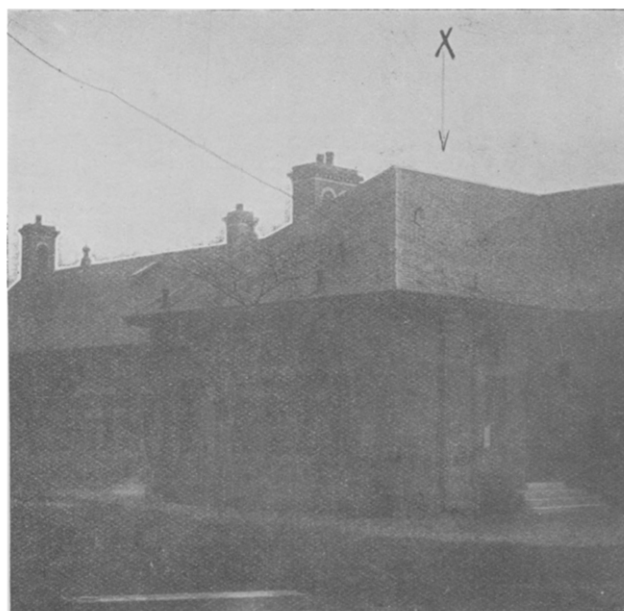
I might add that at the hospital equal volumes of nuts and coke were weighed, and the latter was found to be $\frac{7}{10}$ ths of the former.

Drawbacks to the Use of Coke as Fuel.—(1) Greater cost, (2) more ash, (3) more careful stoking, and greater difficulty in "damping down," (4) greater bulk of material to handle.

With reference to the cost it has to be pointed out that the freedom from smoke is worth the difference (about £4 over a year). Drawbacks (3) and (4) were readily met by the engineer, as when nuts were in use he had to



PHOTOGRAPH No. 3.



PHOTOGRAPH No. 4.

£123 18s.; and 222 of coke £127 13s. Thus there has been a slight monetary loss in order to gain freedom from smoke.

Calorific Value of Coal and Coke.—According to Prof. T. Gray, Glasgow Technical College, to whom I am indebted for the figures, an average value for Scotch coal lies between 12,600 and 13,000 Brit. thermal units per lb. while two samples of coke gave each about 13,200 Brit. thermal units per lb. It has to be pointed out, however, that owing to the variation in the percentages of ash and water in different samples, no accurate general conclusions can be arrived at from these data. In view, however, of the fact that over periods of a year each and under similar conditions of

sweep the boiler tubes daily, whereas with coke once a week suffices. This he considers to be ample compensation.

Conclusions.—I fear that, so long as the inferior (and generally more smoky) qualities of coal can be got more cheaply than coke, no attempt on a large scale will be made in the direction of using the latter with the object of improving our smoke-laden atmosphere. Mechanical stokers have done much to solve the problem even when using dross, but the capital outlay is considerable. For small boilers, such as the one which forms the subject of this paper, coke is to be commended when it is desired to spare the atmosphere from smoke pollution.