

Applications,  
cont.

said, higher than could be obtained in practice, where indeed the full capabilities of a fuel are never realized, and this may be ascribed to several causes:—the fuel is scarcely ever fully consumed, a part escapes combustion by passing off in the form of combustible gases and smoke, another portion falls through the grate with the ash; there is loss of heat by radiation and conduction, that by conduction not only occurs through the materials of the furnace, but also from the gaseous products and excess of air, which carry with them a considerable portion of the heat into the chimney and air; heat is also conducted away by the ash which falls through the grate, and a further portion is absorbed in vaporising the hygroscopic and combined water.

In the employment of fuel, its physical and chemical constitution must be taken into account, and the conditions ascertained which are most conducive to the development of its full calorific power:—the furnace should have its details arranged with special reference to the burning of a particular fuel, as may be found after a trial, the best and most economical arrangement for that fuel. With reference to the value to be attached to the experimental results obtained by actually burning a portion of the fuel under the boiler, the information which even this method affords for practical guidance is not always so reliable as might appear at first sight. Touching the evaporative power of coals, Dr. Percy says\*—"Numerous costly and very elaborate experiments have been made in this and other countries to determine the relative values of different kinds of coal with reference to steam navigation; and I have no hesitation in expressing my conviction that some of the results may lead to very erroneous conclusions. A particular boiler—it may be an old one—is selected for the purpose of experiment and set over a particular fire-grate, etc. We will suppose two varieties of coal, say A and B, to be tested in this apparatus, and that, weight for weight, A is found to yield more steam than B; whereupon A is pronounced decidedly superior as a steam coal to B. But it is quite possible that this result may be due to the particular boiler and fire-grate being best suited to the manner in which A burns; and that under another boiler, and with another form of fire-grate, etc., B might be found superior to A. Experiments, indeed, have established that such is sometimes actually the case."

\* Percy's Metallurgy; Refractory Materials and Fuel, London, 1875.

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