Manufacture of 'Colloidal' Fuel

SINCE 1879, numerous attempts have been made to produce a suitable mechanical mixture of coal and oil that would be capable of retaining the coal particles in suspension for a sufficiently long period and at such temperatures as would be likely to obtain in normal working conditions, where such fuels could be used.

Fairly successful attempts were made in 1918 on the U.S. patrol ship *Gem*, using a blend of 67.8 per cent oil and 31.2 per cent coal dust. More recently, great prominence has been given to this question as a result of experiments made on the Cunarder, S.S. *Scythia*, using a mixture of 60 per cent of oil and 40 per cent fine coal.

Despite these tests, progress in the development of a 'colloidal' fuel has been very slow. This is due to two causes:—first, the difficulty experienced in keeping the mixture in a stable condition where it had to be stored for any lengthy period before use; and secondly, the high cost of pulverising dry coal to a sufficient degree of fineness to make a suitable and stable liquid emulsion.

The former difficulty can be readily appreciated when it is realised that the specific gravities of coal and oil are 1.3 and 0.9 respectively. Various attempts have been made to keep the coal particles in suspension by the addition of fixateurs (such as rosin, paraffin wax, etc.) or by the addition of 'peptising' fluids which tend to increase flotation by splitting up the particles of coal into still smaller particles. While the fixateurs have been more or less successful in increasing the period of suspension, the cost of peptising fluids makes their general use prohibitive.

From the results of a demonstration given by Messrs. Wyndhams Liquid Coal Co., Ltd., at their Cardiff works on January 23, it would seem that their engineer, Mr. Stephen Wyndham, has recently made great progress in overcoming both of the difficulties referred to. In his new plant, he has eliminated the costly process of dry coal pulverisation by mixing the fine coal as received from the colliery with an equal amount of heavy oil and then passing the coal-oil mixture through a series of rolls until a fineness of 99 per cent

through a 200 I.M.M. mesh is obtained for the coal particles. This degree of fineness together with the aeration of the mixture which takes place in passing it through the mixer and between the mixer and the successive series of rolls, seems to give a very stable mixture which will retain the coal particles in suspension for at least four months under normal working conditions.

The plant is very simple in construction and no chemical processes are involved. The class of coal used is that known as 'duff' (namely, coal less than $\frac{3}{16}$ in. in diameter) and is fed from an overhead hopper through a worm screw into the rotating mixture where it meets an oil spray, forming a paste of coal and oil. The predetermined quantities of coal and oil forming this paste are automatically regulated in their entry to the mixer, which is fitted with a spiral worm cast on the inside and passing from top to bottom of its 6 ft. length. Although only 18 in. in diameter, it is capable, when working continuously for six days a week, of producing 100 tons of colloidal fuel.

The paste passing from the mixer is pumped to a pair of rolls 8/1000 in. apart, rotating in opposite directions at variable speeds of 3 to 1. It is then pumped to the second set of rolls, which are 4/1000 in. apart, and so on down to the fourth or sixth set, according to the degree of fineness required to produce stability for any particular class of coal.

The cost of one 100 ton per week plant is approximately £1,000. Very little manual labour is required to operate it and the maintenance charges ought to be low, as the principle of wet milling is used throughout the process.

In burning the oil underneath a steam boiler, the fuel is pre-heated to about 250° F., at a pressure of 15–20 lb. per square inch, and the air is maintained at a pressure of 2 lb. In the demonstration test, this gave a clear smokeless flame, without a trace of coking at the burner tip.

It would appear that we are at last within sight of the solution of a problem which has taxed the ingenuity of engineers for at least half a century.

Obituary

SIR E. A. WALLIS BUDGE

IN the course of the year 1934, Egyptology had to record a heavier loss of life amongst its leaders than has occurred in any other single year of its century odd of history. Five of the seven who died were Englishmen; the last was Sir Wallis Budge, for more than thirty years keeper of Egyptian and Assyrian antiquities in the British Museum, and one

of the two most widely known Egyptologists that Great Britain has produced. The characteristics that gave him the unique position which he held in the public mind were no ordinary gifts, and are perhaps not to be found combined in our own generation.

Ernest Alfred Wallis Budge was born in 1857 of a Cornish Quaker family, to which no doubt he owed that abiding interest in the study of religions which

was the mainspring of so much of his work. In the man himself, assisted perhaps by the not easy circumstances of his early years, lay a 'power of work' which quite transcended mere industry and was his outstanding characteristic and the envy of those who served him. As a boy, it attracted the attention of his superiors and eventually won him the backing of W. E. Gladstone. At Cambridge, it brought him University prizes and an unusually wide and thorough knowledge of Semitic languages with which to start his official career in the British Museum.

The bare record of Budge's exceptionally early promotion to the full responsibility of keepership, followed by nearly two columns of 'Publications', are still to be read in the current "Who's Who". But no mention is made there of the period during his assistantship, when, after the retirement of Renouf, the responsibility for the Department was his, without the privileges of the appropriate office. In two fat volumes, "By Nile and Tigris" (published 1920), parts at least of the adventurous life at home and abroad, which lay behind those dates and titles, are to be found. It is a story of vital and impressive contacts with the great pioneers of Egyptian and Assyrian studies, and of lasting gratitude to early masters; of missions on the Trustees' behalf to Egypt and Mesopotamia, covering a period of nearly thirty years; of the famous action for slander—*Rassam v. Budge*, of which the extensive account from the issue of NATURE for August 10, 1893, emphasises the national interest at stake and more than vindicates Budge's part in the case. This unofficial account of a scholar-civil servant's official career was as near as its author could permit himself to come to an autobiography; but we may guess that it tells only half the tale, and no one who reads it can escape the regret that we shall never know the rest.

Neither the long tenure of his office nor his massive learning could by themselves have made Budge the public figure that he was; though both contributed to his fame. It was the vigour and quality of his personality that endeared him and 'made his name to live' on the lips of as many thousands as there were individuals who came to blows with him professionally. But no man of his virility could fail to make enemies; nor could one of his positiveness easily escape criticism, some of it deserved. His worst enemies would not deny that he was possessed of prodigious learning; but inaccuracy in its setting forth rendered him liable to endless attack. That charge was not always a just one. His most important scientific work, which naturally was that most criticised by his colleagues, was the edition of texts, generally of considerable length, in many languages—Assyrian, Egyptian (Hieroglyphic and Hieratic), Coptic, Ethiopic, Syriac. It was a principle with him that in editing ancient authors his business was simply to present their text in a printed form which would be accessible to modern scholars. The correction of mistakes in the text, if indeed they were mistakes, was a secondary and later task with which he was not concerned. As a result, he some-

times received the censure which should have been addressed to the original scribe of the manuscript in question. There was something to be said on both sides of the argument, but however strong the attack, Budge's claim to be accounted among the great Oriental scholars of the last fifty years will grow rather than fail as personal considerations automatically die, leaving the impressive series of his editions of primary texts to speak for themselves.

Then again, the extraordinary number and size of the books which Budge turned out, the majority necessarily of a popular or semi-popular nature—while a matter of pride to himself—was often counted against his reputation. But in truth, it was a part of his greatness that he knew how to do what no other Egyptologist in Great Britain could do by writing, namely, to bring his subject within the reach of the ordinary reading public. Nor were his books a mere popularisation of that side of Egyptian studies which might be supposed to have a natural attraction for the man in the street. Any teacher of the subject, and still more any museum official familiar with the endless stream of inquiry on matters Egyptian which pours through the British Museum, is well aware that almost all stock questions relating to the history, customs or antiquities of Ancient Egypt can be most expeditiously answered by referring the inquirer to one or another of Budge's handbooks. The secret of his success lay, of course, in his Museum experience. Budge was above all things a devoted public servant, and after he had retired from the Museum and until the last, he remained as jealous for the authority and privileges of the Trustees, the representatives of the public, as he had been loyal to their interests during his service.

The tradition of scholarly research and authoritative learning in the subjects with which they dealt stood high among the officials of the British Museum when Budge entered it, but he was one of the first to bring that wealth of knowledge within the reach of the general public, even though, for various reasons, some of the methods he used would not now be considered good museum technique, or even effective for the purpose he sought. But it was of paramount importance that he should have been so fully conscious that the antiquities under his charge were the property of the nation, and that it was therefore his duty, first to take proper care of these antiquities, and secondly to make them as much available to the nation as was possible. He had his own clear ideas as to the manner in which both purposes should be achieved; and both brought him into conflict with authority. But he knew that in principle he was right, and he was proud to think that his knighthood was the reward not of his contribution to scholarship, nor of his success as a populariser of a branch of learning, but to the faithful performance of his stewardship. It was from his determination to serve the public that he learned what they wanted—or at least, what they thought they wanted—and gave it to them so successfully in his books and in the galleries under his charge. S. R. K. GLANVILLE.