

Dr. F. W. Carter, F.R.S.

FREDERICK WILLIAM CARTER, who was until his retirement in 1946 consulting engineer with the British Thomson-Houston Co., died on May 29 at the age of eighty-one.

A man of impressive appearance and of great mathematical ability, he was nevertheless very modest, gentle and reserved. He was almost the first mathematician of high order to apply his abilities exclusively to the practical problems arising during the development of a great engineering industry, and in so doing he built up a world-wide reputation. Behind the mathematics which he used so successfully, he had a clear physical conception of the problems with which he dealt, and in many cases saw the form of the answer before the problem had been worked out in detail. So his analyses included those factors which would give a satisfactory engineering answer, and ignored factors not significant. All his writings are models of lucidity and of the economical use of words, and are a pleasure to read in spite of the difficulty of the subject-matter.

Dr. Carter's choice of subjects was very wide; the first paper published in 1898 dealt with "The Smashing Point of a Glow Lamp"; the last, published in 1944, with "Anti-aircraft Gunnery". Between these two extremes he ranged over many problems both electrical and mechanical. His papers were published in the *Proceedings* of the Royal Society, of the Cambridge Philosophical Society, of the Institution of Civil Engineers, of the Institution of Electrical Engineers, and in many of the important technical journals.

By electrical engineers Dr. Carter will always be remembered for his investigations on magnetic fields in electrical machines. In this work he used the Schwarz-Christoffel transformation, described by J. J. Thomson in "Recent Researches in Electricity and Magnetism". He was the first to apply it to a practical engineering problem, and after a lapse of time, while engineers acquired an understanding of this weapon of attack, others followed his lead. Three papers on this subject were published: one in 1900, another in 1901, and the third, where he collected the results of his researches, in 1926. 'Carter's coefficients', quoted in text-books on electrical design, and used by electrical machine designers, were derived from this work and perpetuate his name.

In mechanical engineering Dr. Carter completed one investigation of outstanding originality. It relates to the running characteristics of locomotives with special reference to their stability of operation. He began, in a paper on "The Electric Locomotive" in 1916, by propounding a theory to explain unstable running of locomotives, introduced and defined a new quantity which he called 'creepage', and made a qualitative analysis for conditions of stability. The subject was developed in two further papers in 1926 and 1928, based on Love's work on elasticity and Routh's work on criteria of stability. A final paper, in 1930, applied these earlier results to analyse the characteristics of certain locomotives involved in derailment accidents. Using models, he gave a practical demonstration of the correctness of his theory at a conversazione of the Institution of Civil Engineers in 1929.

One further sample of his work is worthy of special mention. In 1922 he published a book on "Railway Electric Traction". Thirty years later it is still accepted as the standard book dealing with the fundamentals of the subject.

In addition to his published works, comprising thirty-four papers and one book, he carried out many investigations for the British Thomson-Houston Co., which he served during almost the whole of his professional career. One of these, in 1939, was the determination of stresses in a large forging during heating and cooling and in the transition from the plastic to the elastic state.

He entered St. John's College, Cambridge, in 1892, taking his degree in 1895, when he was placed eighth wrangler. In 1926 he was awarded the Sc.D. degree at Cambridge, the first in the Faculty of Engineering for more than fifteen years, so far as can be traced in the records. He was elected a Fellow of the Royal Society in 1932. He became a full member of the Institution of Civil Engineers in 1919, and was awarded the George Stephenson Medal and the Telford Premium by the Institution. He became a full member of the Institution of Electrical Engineers in 1912, and was awarded a premium for his work on magnetic fields.

He married in 1908 Edith, youngest daughter of James Cramp, of Coventry, and sister of Prof. William Cramp. He is survived by his widow and three sons, the eldest of whom is Prof. G. W. Carter, professor of electrical engineering in the University of Leeds.

K. R. HOPKINS

NEWS and VIEWS

Meteorology in the University of London:

Sir David Brunt, F.R.S.

SIR DAVID BRUNT is retiring in September from the chair of meteorology in the University of London and the post of head of the Department of Meteorology in the Imperial College of Science and Technology, London, to which he was appointed in 1934. The Department, the only one devoted to the subject in a British university, has greatly flourished under Sir David's direction and has attracted students from all parts of the world. The research work carried out there has much increased, and the teaching staff, apart from Sir David, has grown to five and includes two University readers. After a brilliant career in

mathematics at the Universities of Wales and Cambridge, Sir David became a meteorologist in 1916 as an officer of the Meteorological Section, Royal Engineers. On demobilization in 1919 he was appointed Superintendent of Army Services in the Meteorological Office. This post involved control of meteorological work in chemical warfare and ballistics; thus the study of turbulence and diffusion in the lowest layers of the atmosphere, to which he has since contributed so much, became a major official responsibility. During his service in the Meteorological Office he also made important contributions to the study of periodicity in European weather, to radiation, and to the dynamics of depressions and anticyclones. Shortly after his appointment in 1934