

mechanical, technological and electrical engineers. The majority of the students were Indonesians. But a young industry is not the right place to gain general experience. Scholarships, therefore, were extended to young Indonesian graduates of the University, which would enable them to gain experience abroad. In this way, the Government hoped to create Indonesian industrialists.

Large factories also came into existence. Persons well trained for research and with wide experience are rare in the Netherlands East Indies. To meet these difficulties all these large factories are formed as affiliated enterprises of well-established factories abroad. In this way, they can profit by the research work and experience of the mother industry, and every development abroad is available with a minimum of cost.

The future of the Netherlands East Indies industry lies in the production of consumer goods, as the iron ores found in the Netherlands East Indies are poor and the coal is very soft. Because of this, heavy industry, based on iron, is practically impossible. Though we produce a large quantity of tin, this metal will continue, therefore, to remain an export product. The case is different regarding bauxite. Large masses of rich ores are available, and in the vicinity of the mines huge water-power plants can be installed. The construction of an aluminium factory had already started when the Japanese invaded Sumatra. Other metal ores found in the Netherlands East Indies, perhaps with the exception of nickel, are all poor in quality or in quantity.

On the other hand, raw materials such as rubber, sisal, wood and fibres for paper and rayon, vegetable oils, salt, tannery barks, can be had in any quantity. (Salt and sulphur as bases for chemical industries are available. Cow-hides, fish and fruits can serve as the foundation for further industry.) Water-power, coal and natural gas are readily available, and the Javanese is a good labourer, as long as he does not have to handle too much weight. As a spinner and weaver, for example, he is an excellent worker, but in the rolling mill he would lack the desired qualities.

## OBITUARIES

### Mr. Robert W. Paul

THE announcement of the death on March 28 of Mr. Robert W. Paul will recall to many the great part he played in the manufacture of electrical measuring instruments and the development of the cinematograph.

R. W. Paul was born at Highbury, London, in 1869 and was educated at the City of London School and at the City and Guilds Technical College, Finsbury. He worked in the electrical instrument shop of Messrs. Elliott Brothers and obtained there a practical knowledge of instrument making which was invaluable to him. In 1891 he started business for himself as an instrument maker in Hatton Garden, working long hours and using his inventive powers in perfecting the small, but important, parts of electrical instruments. He was fortunate in being able to work under the inspiration of such pioneers of electrical measurement work as Perry, Ayrtton and Mather. It was on the manufacture of instruments

developed with these pioneers that Paul built up a successful business.

In 1903 Paul invented a moving-coil galvanometer in which the coil is supported on a single pivot resting on a jewel, placed in the centre of a steel ball which is fixed between the poles of a permanent magnet. He gave the instrument the eminently suitable name of 'Unipivot' and it met with an immediate success. The first model gave a full deflexion for about 60 micro-amperes (coil resistance 50 ohms), a sensitivity far beyond that of any pivoted galvanometer then in existence. The 'Unipivot' maintained this proud pre-eminence for many years. Realizing the small amount of energy required to actuate it, he developed a series of resistances, shunts, etc., which made it an invaluable instrument for laboratory and test-room work. He fitted an efficient locking device which held the coil with its pivot away from the jewel, thus rendering it safe for transit. He was fond of demonstrating the robustness of the instrument and the efficiency of the clamping device by throwing it in its leather case downstairs, or even using it as a football.

In 1900 Paul transferred his works to Muswell Hill and it was there that the majority of his instruments were made.

About 1907 he commenced to make instruments designed by Albert Campbell for alternating current work, a collaboration that was most fruitful in producing instruments which have stood the test of time in a remarkable manner.

Paul's fame as an inventor will probably rest on the cinematograph rather than on his instruments. He was the first maker in Great Britain of a projector for showing pictures continuously, and his mechanism for feeding forward the film intermittently, generally referred to as the 'Maltese cross', is still universally used. The story is well known of the excitement caused in Hatton Garden when the first picture was shown in his workshop. The first semi-public display was given at the Finsbury Technical College in February 1896. He went to immense trouble to make and take pictures. In June 1896, he photographed "Persimmon" winning the Derby and projected it himself the same evening at the Alhambra. The excitement of the audience was intense, and it is said that Paul was called before the curtain six times. He fully realized the possibilities of the cinematograph for scientific work. In conjunction with Prof. Silvanus Thompson and a group of students, a series of diagrams were drawn showing changes in some phenomenon, for example, in the field between two magnets as they approached each other. These various diagrams, or pictures, were photographed separately and then projected continuously in the accepted manner of a Walt Disney film. About 1912 he disposed of his cinematograph rights and no longer interested himself in the industry.

In 1920 his business was amalgamated with the Cambridge Scientific Instrument Company, the combined firms now being known as the Cambridge Instrument Company Limited.

During recent years he developed, with Sir William Bragg, the Bragg-Paul pulsator, an apparatus for assisting breathing in cases of respiratory paralysis. He had the satisfaction of knowing that this apparatus had been instrumental in saving the lives of several children.

The scientific instrument making industry owes much to Paul's efforts to improve the technical education given to its workers. He advocated, and indeed put into practice in his own works, the holding of

technical and theoretical classes for the training of apprentices in the works. He showed his further interest by founding the Paul Scholarship, which is administered by the Institution of Electrical Engineers, for enabling young students to enter the works of a scientific instrument firm for two years training.

Paul interested himself in several societies and served on the councils or boards of the Institution of Electrical Engineers, the Institute of Physics and the Physical Society. He acted as treasurer of the last-named Society during 1935-38 and as vice-president during 1939-42. He had also served the Royal Institution as a manager and a vice-president. He was awarded the sixteenth Duddell Medal by the Physical Society in 1938.

Mention should be made of the admirable collection of electrical instruments that he assembled at the Royal Albert Hall in 1931 for the Faraday Centenary Exhibition. Many of the exhibits were constructed under his direction, several with his own hands.

In his prime, Paul had immense energy and a great capacity for getting things done. With it all, he had a dry sense of humour and an attractive personality. The wreath sent by the Cinema Veterans 1903 Society for his funeral was inscribed: "The first Englishman to produce and exhibit a Cinematograph Film".

R. S. WHIPPLE.

WE regret to announce the following deaths:

Dr. Edgar Allen, professor of anatomy at Yale University School of Medicine, aged fifty.

Prof. A. A. Boon, emeritus professor of chemistry at Heriot-Watt College, Edinburgh, on April 2, aged seventy-six.

Prof. Gary N. Calkins, emeritus professor of protozoology in Columbia University, on January 4, aged seventy-three.

Lieut.-Colonel E. Kitson Clark, president during 1931-32 of the Institution of Mechanical Engineers, and during 1921-22 of the Institution of Locomotive Engineers, on April 15, aged seventy-six.

Dr. Albert Hassall, bibliographer and formerly assistant chief of the Zoological Division, U.S. Bureau of Animal Industry, on September 18, aged eighty-one.

Dr. J. E. Ives, for many years physicist to the United States Public Health Service, aged seventy-seven.

Prof. A. Lloyd James, University professor of phonetics, School of Oriental and African Studies, London, aged fifty-eight.

Prof. Heinrich Zwicky, professor of veterinary medicine at the Zurich faculty of veterinary medicine.

## NEWS and VIEWS

### Mr. P. I. Dee, F.R.S.

MR. P. I. DEE, whose appointment to the chair of natural philosophy at the University of Glasgow was announced in *NATURE* of April 17, has for the past twenty years been one of the most outstanding of the younger physicists at Cambridge; first as student, then as teacher and research worker. From Marling School, Stroud, Mr. Dee entered Sidney Sussex College in 1922 as entrance exhibitioner. In 1925 he obtained a first class in Part I of the Natural Sciences Tripos and was elected scholar of his College. In the following year he gained a first in physics in Part II of the Tripos, was elected research scholar at Sidney and started work under Prof. C. T. R. Wilson at the Solar Physics Observatory. For several years after this, Mr. Dee's work continued to be mainly on the Wilson cloud chamber, and it gained him in 1928 a Taylor research fellowship (at Sidney) and in 1930 the Stokes studentship, which required his emigration to Pembroke. On the expiry of his tenure of this studentship in 1934, his own College reclaimed him with the award of a full fellowship (without teaching duties). Meanwhile, the University of Cambridge had appointed him demonstrator and then lecturer in the Cavendish Laboratory. Here, for a period, he was responsible for the teaching in the advanced practical class, and in 1937 he took over the organization of research in the High Voltage Laboratory, in which, at the outbreak of the War, he had just succeeded in bringing the second (2-million volt) Philips set into operation. When this set comes to be re-assembled and work restarted, when the War ends, his colleagues at Cambridge will miss his leadership more than brief words can convey. Mr. Dee was elected to the Royal Society's fellowship in 1941.

### Prof. C. A. Elvehjem

THE thirty-second Willard Gibbs Medal, the highest award of international scope which the Chicago Section of the American Chemical Society can bestow, has been given to Prof. C. A. Elvehjem, professor of biochemistry in the University of Wisconsin. In 1928, Prof. Elvehjem with his associates received wide recognition for work involving trace elements in nutrition. They discovered that copper is essential to the formation of haemoglobin. Later their studies revealed the place of a number of metals in nutrition, such as iron, manganese and aluminium. While at Cambridge, Prof. Elvehjem conducted studies on tissue respiration which have since been applied to the study of vitamin functions. Use of nicotinic acid in the prevention and cure of pellagra and other deficiency diseases have developed from Prof. Elvehjem's discovery. The role of nicotinic acid in animal nutrition has also been developed. He is now conducting studies on the newer members of the growing family of B vitamins.

### Institute of Fuel: New President

DR. E. W. SMITH has been elected president of the Institute of Fuel for the session 1943-44, and will take office in October next. Dr. Smith has been well known in the fuel world for many years, having been chief chemist at the Birmingham Corporation Gas Department for several years before becoming technical director of the Woodall-Duckham Companies some twenty years ago. In 1941 he was appointed by Sir Andrew Duncan, then president of the Board of Trade, as director-general of gas supply in Great Britain, a position he continued to hold when the Government interests in the gas industry