

fatigue increased, they tended to give more vigorous and more numerous strokes, to pause longer between each stroke, and to take a longer time over each stroke. In other words, Messrs. Farmer and Brooke prove that the tired "rougher" is "not only working slower than when she is fresh, but is also expending her energy extravagantly."

University and Educational Intelligence.

LONDON.—The Franks research studentship in archaeology, value 100*l.* for one year, is offered. Applications must reach the Academic Registrar, the University of London, South Kensington, S.W.7, by, at latest, March 2.

SHEFFIELD.—The council of the University has made the following appointments:—Mr. Douglas Hay to be professor of mining; Mr. A. J. Saxton, assistant lecturer in physics; Mr. L. W. Cole, assistant lecturer and demonstrator in botany; Mr. H. W. Southgate, lecturer in pharmacology; Dr. E. F. Finch and Mr. V. Townrow, assistant curators of the Pathological Museum; and Dr. A. G. Yates, demonstrator in medical pathology.

LAST year the Civic Education League organised a very interesting Easter visit to Belgium for the purpose of civic study. This year a similar visit to Holland is being arranged. Anyone interested in civic studies may join the party, and early application to Miss Margaret Tatton, secretary, Civic Education League, Leplay House, 65 Belgrave Road, S.W.1, should be made. Members of the party will have special facilities for first-hand contact with the work and *personnel* of the chief social and economic institutions of the country.

THE annual prize distribution at the Sir John Cass Technical Institute, Aldgate, E.C.3, was held on Wednesday, February 8, when the prizes were distributed by Prof. William Rothenstein, principal of the Royal College of Art. The chairman of the governing body, the Rev. J. F. Marr, in giving a summary of the work of the institute during the past session, stated that the increase in the number of students had been more than maintained, and that the capacity of the institute, especially in the science departments, had been taxed to the utmost. Twenty students had been engaged in research work during the session, and the total number of investigations published from the institute had now reached 115. The Department of Petroleum Technology, which was initiated at the commencement of the present session, is one of the institute's most important developments, and there were already 150 students in attendance. Representatives of the industry have acted as a consultative committee to advise the governors in respect to the courses of study which have been provided, and the chief oil companies of the London area have given generous support towards the equipment and maintenance of the department. In the course of an address on "Education and Industry" Prof. Rothenstein said he regarded every kind of education as something in the nature of a pursuit after truth. Whereas there was much lip-homage to science and art and the crafts by our merchant princes and captains of industry, these employers did not have the same faith in them as their employees. Commercial men in past civilisations somehow knew how to ask for the best, but that was not true of our own civilisation. What we required was a standard of commerce which knew how to utilise what was best in the arts and sciences, for he refused to believe that people, in general, did not value that which was good and beautiful in production.

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Calendar of Industrial Pioneers.

February 16, 1890. William Jarvis McAlpine died.—Trained under Jervis, the chief engineer of the Delaware and Hudson Canal, McAlpine became State Engineer for New York, and was also State Railroad Commissioner. At the request of the Austro-Hungarian Government he prepared plans for the improvement of the Danube. He was the first American to become a member of the Institution of Civil Engineers, and in 1886 was president of the sister institution in the United States.

February 18, 1888. Thomas Turner Tate died.—In conjunction with Sir William Fairbairn, Tate was the author of memoirs on the vapour tension of superheated steam and on the strength of materials in relation to the construction of iron ships, and was the inventor of the double piston air-pump. For some years he was mathematical master at Battersea Training College, and was known for his educational works.

February 19, 1816. Jean Pierre François Guillot Duhamel died.—An early student at the Ecole des Ponts et Chaussées, Duhamel accompanied Gabriel Jars in his extended industrial tour throughout Europe, and on his return to France did much to improve the manufacture of steel. He afterwards became Government Inspector of Forges and Furnaces, a professor of metallurgy at the Ecole des Mines, and a member of the Paris Academy of Sciences.

February 20, 1825. Joseph Marie François Cachin died.—One of the most distinguished French civil engineers of his day, Cachin was intimately connected with the improvements of the harbour of Cherbourg, and in 1820 published his "Mémoire sur la digue de Cherbourg comparée au breakwater, ou jetée, de Plymouth."

February 20, 1826. Matthew Murray died.—With Fenton and Wood, Murray founded a mechanical engineering works at Leeds which became one of the rivals of Boulton and Watt. The firm built flax-making machinery and constructed some of the earliest Blenkinsop locomotives, and Murray is generally credited with the invention of the short D-slide valve for steam engines.

February 20, 1913. Sir William Arrol died.—The builder of many famous bridges, Arrol between 1882 and 1887 reconstructed the viaduct over the Firth of Tay, and between 1883 and 1890 built the Forth Bridge. This bridge, designed by Fowler and Baker, has always been regarded as one of the greatest engineering structures in the world. With a total length of 8295 ft., of which the three cantilevers account for 5349 ft., the bridge contains 51,000 tons of steel, while the towers rise to a height of 360 ft. and the line is carried 150 ft. above the water at high tide. Arrol was knighted at the opening of the bridge by Edward VII.

February 21, 1888. George Henry Corliss died.—The greatest steam-engine builder of America, Corliss about 1848 entered into partnership with Nightingale at Providence, Rhode Island. Adopting the trip gear of Sickells, he brought out the Corliss form of steam engine, which on account of its improved economy and regular turning movement became known all over the world.

February 21, 1912. Osborne Reynolds died.—For nearly forty years professor of engineering at Owens College, Manchester, Reynolds made many investigations of importance to engineers and shipbuilders, such as those on screw propulsion, the flow of liquids, the condensation of steam, the transmission of heat, and lubrication. He was the inventor of the compound turbine.

E. C. S.