

and unique work." It was pronounced by Mr. Turnbull, Engineer of the East Indian railway, to be by far the most striking work of railway masonry in India; and the Chief Commissioner of the Central Provinces declared his admiration of the excellence and beauty of the work, which would, he thought, in all probability, last for ages.

Mr. Rushton's connection with the Great Indian Peninsula Railway Company terminated in 1868; and in the same year, and about the same time, the agent of the company, General Rivers, also retired. Previously to their departure from India, a farewell dinner was given to them by the staff of the railway company and other gentlemen. On this occasion Mr. Rushton was presented with an address; and a sum of nearly £1,000, subscribed by the employes of the Company, was soon after forwarded to the Messrs. Elkington, in England, for a service of plate, the selection of which was left to Mr. Rushton.

With Mr. Rushton's arrival in England, in November 1868, his professional career closed. Eighteen years passed in Egypt and the East, with but two short intervals of repose, had told upon a constitution originally strong. He had long suffered from a painful affection of the throat, which ultimately terminated in bronchitis. He died on the 10th of June, 1873, in Liverpool, at the comparatively early age of fifty years. In his profession he was an honest worker; in his habits retiring and abstemious; and in the general relations of life he bore himself as a generous, temperate, and high-principled man. Of his skill as an Engineer his works give evidence; for his character as a man, the testimony of his friends.

Mr. Rushton was elected a Member of the Institution of Civil Engineers on the 4th of December, 1866.

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MR. JAMES SAMUEL was born at Glasgow on the 21st of March, 1824. He was educated at the High School of that city, and afterwards attended the classes for engineering by Professor Lewis Gordon at the Glasgow University. In April 1839 he was articled to Mr. Daniel Mackain, M. Inst. C.E., engineer of the Glasgow Waterworks, and subsequently held for three years the position of resident engineer at the Printing, Dyeing and Bleaching Works of his father near Glasgow, for which he designed and superintended the construction of the buildings, machinery, reservoirs, watercourses, &c. He came up to London, and was

appointed resident engineer of the Eastern Counties railway in January 1846, which position he held till June 1850. It was during his connection with this railway that, in conjunction with Messrs. Adams and Richardson, he brought out the fish-joint patent, to the improvement and development of which he devoted years of study and labour, and which, under various modifications, has been adopted on all railways. He likewise carried out numerous experiments on light engines and steam carriages on railways with the object of reducing the weight and cost of the rolling stock, with very satisfactory results.

Between the years of 1851 and 1858 he constructed successively the Morayshire, the Newmarket, the Llanelly extension, and Vale of Towy railways; also the new stone bridge over the river Avon at Evesham.

Early in 1858 he made, in conjunction with Mr. John Pitt Kennedy, M. Inst. C.E., the plans and estimates for the line of railway from Smyrna to Cassaba, and thence to Ushak, in Asia Minor, the former part of which railway has since been carried out by Mr. Edward Purser, M. Inst. C.E. In 1861 he went out to the United States to report upon and estimate for the completion of the Grand Rapids and Indiana railway, in the State of Michigan. He was then continuously engaged in inspecting and reporting upon various railways in Austria, France, Germany, and Russia. In May 1863 he accompanied a party of engineers to examine and report upon the feasibility of constructing a ship canal from the port of Greytown, on the Atlantic, up the river San Juan, and through the lakes of Nicaragua and Managua, to the bay of Tamarindo, on the Pacific Ocean; but, after a careful examination, he found that the cost of this route, as laid down by the French Engineers—from whose preliminary surveys the scheme originated—would be far in excess of that contemplated by the promoters, and the project was abandoned.

In the beginning of 1864 he was appointed, together with Colonel Talcott, joint engineer in chief of the Mexican railway from the port of Vera Cruz to the cities of Puebla and Mexico. Colonel Talcott retired from his connection with the line at the latter end of 1866. In 1871 and 1872 Mr. Samuel carried out a railway of 3 feet gauge in Cape Breton for developing the extensive coal mines in that region. In 1869 he exchanged the appointment of chief engineer to the Mexican railway for that of consulting engineer, a post he held till his death, which took place on the 25th of May, 1874, of paralysis, after an illness of three months.

Mr. Samuel was elected a Member of the Institution on the 5th of June, 1849. He was a man of good commercial acumen and sound judgment; but his temperament was very sanguine, and he was easily led. His taste for inventing amounted to a passion, and he was always taking out patents, as well as becoming interested in the patents of other persons.

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MR. THOMAS ALFRED YARROW was born in London in October 1817, and educated at the Military College, Sandhurst. In early life he was engaged under Mr. Edward Dixon, M. Inst. C.E., during the construction of the London and South-Western railway, and afterwards with his uncle, Mr. John Dixon, upon the construction of the Chester and Birkenhead railway. On the completion of the works, Mr. Dixon removed to Birmingham, and Mr. Yarrow was appointed Resident Engineer, which position he filled for some time, and, during the tenure of this engagement, designed and carried out the tunnel from the old terminus in Birkenhead to the Monk's Ferry. He then entered into general practice as an Engineer at Birkenhead, and was occupied in the design and execution of several important works, besides being frequently consulted upon some of the many schemes for the improvement of that rapidly-advancing district. Mr. Yarrow was subsequently appointed Surveyor and Bridgmaster to the County of Chester, when he designed and carried out several new bridges and other works for the county. In 1847, he retired from this position and made a professional tour on the Continent. On his return, he commenced to practise in London, and was engaged principally in connection with railways and sanitary works, among the latter being the purification of the sewage of the Fulham district by peat charcoal, which, so long as the works were in operation, was carried on successfully; a large quantity of the effluent water being profitably applied to the market gardens in the neighbourhood.

In 1856, Mr. Yarrow became Consulting Engineer to the Scinde Railway Company, and soon after to the allied companies, the Punjáb railway and the Indus Steam Flotilla. He manifested much energy and talent in the performance of the duties connected with these important appointments, taking charge of the construction in England of the iron bridges, engines, and machinery. Towards the close of the year 1861, failing health, arising from unremitting attention and anxiety, necessitated his retirement