

him to be right, and he lived long enough to see his work widely acknowledged. While unflinching in his professional life, privately he always retained his genial and lovable nature. Probably many misunderstood him simply through not knowing him. He was so scrupulous, even jealous, in maintaining the line of action which he had marked out for himself that he could not easily brook dictation or thwarting. One of his strong points was a desire for, and adherence to, Standards. When inaugurating his elaborately complete system of testing materials, the ground was clear, and every minute detail was carefully considered by him before adopting his standards. He was an ardent advocate of the adoption by engineers of definite, carefully-sifted, standard specifications, standard sections for rails, and uniform requirements for steel axles, locomotive and carriage tires, &c., all of which he considered would prove of immense advantage to British manufacturers, as they could then readily work up their productions to a given uniform standard. He had always looked forward to publishing a summary of his experimental work, so as to render it accessible to the profession. The opposition he had to contend against delayed the fulfilment of this intention, and ultimately he was glad to leave the work to his son, Mr. William G. Kirkaldy, whom he assisted in its compilation. The book, entitled "Strength and Properties of Materials, with description of the System of Testing," was published in 1891.¹

During the last year or two his health failed considerably; but he was cheerful and genial to the last, and took pleasure in knowing details of experiments, although for several months he was physically unable to carry out tests personally. From about September, 1896, he gradually became weaker, but his mental faculties remained wonderfully clear. He passed away peacefully in the early morning of the 25th January, 1897.

Mr. Kirkaldy was elected a Member on the 3rd March, 1885.

ALFRED RUMBALL, born in London on the 10th August, 1831, was the youngest son of Mr. Thomas Rumball, of Epping, and the stepson of Captain A. Vere Drury, R.N. He was privately educated at Mortlake and at an early age became a pupil of his brother, Mr. Thomas Rumball. Subsequently he was for seven years in the office of Mr. Thomas Bartlett,² who was then engaged on the construction of the London section of the Great Northern Railway for

¹ This work is in the library of the Institution

² Minutes of Proceedings Inst. C.E., vol. xxiv. p. 526.

Mr. Brassey.¹ In September, 1852, he accompanied his brother, who had been appointed Engineer-in-Chief of the Peninsula Railway of Portugal, now forming part of the Royal Portuguese Railways, and was employed as Assistant Engineer, having charge of the section of that line from Lisbon to Santarem. On the completion of that engagement he was appointed Assistant Engineer under Mr. George Neumann on the Victor Emanuel Railway, then being constructed by Mr. Brassey. He was entrusted with the superintendence of 12 miles of that line, and the manner in which he carried out his work was highly approved by Mr. Brassey.

In 1858 Mr. Rumball was appointed by Mr. Charles Vignoles,² Past-President, a District Engineer on the Bilbao and Tudela Railway, on which he remained until 1862.

In that year he was engaged by his brother, who had been appointed Engineer-in-Chief of the Buenos Ayres Great Southern Railway, as Resident Engineer, and it was under his supervision that the first section of that line, from Buenos Ayres to Chascomus, was completed by Messrs. Peto and Betts. Subsequently he carried out the next section of the line, to Dolores, without the intervention of a contractor.

On his return to England, in 1872, Mr. Rumball commenced practice on his own account in Parliament Street, and afterwards in Victoria Street. In 1873 he was appointed Consulting Engineer to the Argentine Government Railway Commission, during the construction of the Central Northern Argentine Railway and of the Rio Cuarto line. That post he held for four years. In 1880 he was deputed by Mr. Thomas Rumball to proceed to Santos and report upon the contemplated improvements in that city, and on his report a company was formed called The City of Santos Improvements Company, he being retained as Engineer.

In 1883 Mr. Rumball was appointed Engineer-in-Chief of the Brazil Great Southern Railway, which was completed under his direction, the contract being taken by Messrs. Cutbill and Co. At the time of his sudden death, on the 17th December, 1896, he was engaged in preparing plans for the extension of that line. From 1889 he also acted as Engineer-in-Chief to the Cordova and North Western Railway, which was completed under his superintendence, the contractors being Messrs. Perry, Cutbill, De Lungo and Co.

In addition to the works above referred to, Mr. Rumball visited Russia, Sweden, Spain and Italy, for the purpose of reporting on engineering projects in those countries, and, in conjunction with

¹ *Minutes of Proceedings Inst. C.E.*, vol. xxxiii. p. 246.

² *Ibid.*, vol. xliii. p. 306.

Mr. Robert Bruce Bell,¹ elaborated in 1875 a scheme for supplying the city of Turin with water. He also devoted much time, in conjunction with Mr. Abernethy,² Past-President, in resuscitating the scheme for new docks on the Thames at Dagenham.

Early in 1860 Mr. Rumball married Jessie, youngest daughter of the late Mr. D. Finlayson, of the firm of Messrs. Finlayson, Bousfield and Co. of Johnstone, N.B., flax spinners. He was elected an Associate on the 14th April, 1863, and was transferred to the class of Members on the 17th December, 1866. In 1878 and 1879 he rendered service to the Institution by auditing the accounts.

DAVID LEONARD BARNES³ was born at Smithfield, Rhode Island, near Providence, U.S., on the 23rd August, 1858. When he was only about eleven his father died, and young Barnes soon had to exercise self-reliance and judgment. At fifteen he began work with a civil engineer, and was occupied two or three years in surveys. In 1876 he entered Brown University, and spent three years there and at the Massachusetts Institute of Technology, as a special student, doing engineering work in vacations. In 1879 he began work in locomotive shops, and during the following eight years served in various capacities in the Hinckley, the Rome and the Rhode Island Works. He eventually became Chief Draughtsman and Mechanical Engineer at the Rhode Island Works. In 1887 he began to practise as a consulting engineer, doing work of some importance for various clients, and for the last eight years he maintained an office as consulting engineer in Chicago, with a New York connection, and was also on the staff of the *Railroad Gazette*, not merely as a writer, but with editorial responsibility, and largely influenced the conduct of that paper in mechanical matters, and especially in locomotive engineering.

Mr. Barnes' work as a consulting engineer covered the design, testing, and inspection of railroad rolling stock. As the Chicago and South Side Rapid Transit Railroad (Alley Elevated) neared completion, he was entrusted with the general supervision of the design and construction of its rolling equipment, signalling, lighting and shop plant. His most important recent work was as Consulting Engineer for the Baldwin Locomotive Works and the Westinghouse Electric and Manufacturing Company in designing

¹ Minutes of Proceedings Inst. C.E., vol. lxxv. p. 293.

² *Ibid.*, vol. cxxiv. p. 402.

³ This account has been abridged from a notice which appeared in the *Railroad Gazette*, New York, 25 December, 1896.