

largely in practically unexplored country, was added to the system. In October, 1911, he was promoted to the position of Vice-President in charge of operation, maintenance, and construction; and in September, 1917, he became President of the Grand Trunk and Grand Trunk Pacific Railways. The Dominion having taken over the control of the consolidated Grand Trunk and Canadian Northern systems, he retired in September, 1922.

He took up his residence in the United States in 1922, and died suddenly at San Diego, Cal., on the 15th May, 1928.

He was elected a Member of The Institution in 1920, and served as the representative Member of the Council in Canada from 1920 to 1922. He was elected a member of the American Society of Civil Engineers in 1889, and was admitted as a Member of the Engineering Institute of Canada in 1907.

He married, in 1899, Cora, daughter of Mr. Lingo, of Denison, Texas.

Sir CHARLES HEBBERT THEOPHILUS METCALFE, Bart., came of a family which had been closely associated with Indian affairs for several generations. He was the only child of the fifth baronet, Sir Theophilus John Metcalfe, and Charlotte, daughter of Lieut.-General Sir John Low, K.C.B., and was born at Simla on the 7th September, 1853.

After being educated at Harrow and University College, Oxford, where he gained his Rugby Blue in 1875, he served articles to Messrs. Sir Charles Fox and Sons from 1878 to 1881, and was then engaged as their assistant on the construction of the Southern Railway of Ireland and on the West Lancashire Railway. During 1882-3 he acted as resident engineer for the firm on the Southport and Cheshire Lines Railway and the Hesketh Marsh Reclamation, and during the following year he was resident engineer on the Liverpool, Southport and Preston Junction Railway.

In 1886 he was appointed, jointly with the late Sir Douglas Fox, Past-President, engineer for the Liverpool and St. Helen's and South Lancashire Railway. He also acted as joint engineer with Sir Douglas Fox for the Bechuanaland Railway, for which he had charge of the survey during 1888-91.

In 1892 he went to South Africa to investigate a proposed line from Kimberley to Vryburg on behalf of the Exploring Company, in which Rhodes was interested, and which was the predecessor of the Chartered Company. During this visit to Africa Sir Charles Metcalfe again came in touch with Rhodes, with whom he had already formed a warm friendship at Oxford, and thereafter the two were closely associated until Rhodes's death.

Sir Charles Metcalfe and Sir Douglas Fox and Partners acted jointly as consulting engineers for the construction of the various lines constituting the Rhodesia railway system, which were built under the auspices of Rhodes and the Chartered Company. During this period and until 1914 Sir Charles lived continuously in Africa. He personally located all the lines and was in charge of all

construction work, of which one of the notable achievements was the Victoria Falls bridge. He lived to see these early pioneering lines grow into a prosperous and still rapidly expanding system, with 2,500 miles of track, an annual traffic of 5 million train-miles, and an annual gross revenue of £5,000,000.

He also acted as joint consulting engineer with Sir Douglas Fox and Partners for the Benguela Railway through Portuguese West Africa, which was begun in 1903, and reached the Congo frontier in August, 1928. The Benguela Railway, the triumph of another great African pioneer and a friend and coadjutor of Rhodes, Sir Robert Williams, has a total length of 850 miles and will give a western outlet to the great Katanga copper fields of the Congo, as well as to Northern Rhodesia. As in the case of the lines in Rhodesia, Sir Charles Metcalfe traversed the whole intended route of the Benguela Railway, to a large extent on foot. He was joint consulting engineer for the construction of the Shire Highlands Railway in Nyasaland and for the Trans-Zambezi Railway through Portuguese East Africa from Beira to Muraça on the Zambezi river.

His last active work abroad was a visit to Palestine in 1919 in company with Mr. Ralph Freeman, M. Inst. C.E., to report to the Zionist Organization on the future development of Palestine.

He was at various times associated with many other enterprises, and was a Director of the Victoria Falls Power Company from its inception.

He was elected an Associate Member of The Institution in 1885, transferred to the class of Members in 1897, and served as a Member of the Council from 1904 to 1906. He died at his residence, Winkworth Hill, Godalming, on the 29th December, 1928.

ALEXANDER BAIN MONCRIEFF, C.M.G., son of Alexander Rutherford Moncrieff, and brother of the late J. C. B. Moncrieff, M. Inst. C.E., was born at Dublin on the 22nd May, 1845. He was educated at Belfast Academy, and in 1860 entered the Inchicore works of the Great Southern and Western Railway as a pupil of Mr. W. Miller, completing his articles under Mr. Alexander McDonnell, M. Inst. C.E. In 1866 he entered the works of Messrs. Dübs and Company, at Glasgow, being engaged upon the design of locomotives. He returned in 1867 to the Inchicore works, and was put in charge of out-door works and buildings. In 1869 he was appointed locomotive foreman to the Irish North Western Company, and from 1871 to 1874 he was engaged in private practice and in the management of a machine shop in Hertfordshire.

He entered the service of the South Australian Government in 1874 as a draughtsman under Mr. H. C. Mais, M. Inst. C.E., the Engineer-in-Chief. During 1878 and 1879 he assisted Major-General P. H. Scratchley, R.E., Assoc. Inst. C.E., in Victoria, New South Wales, and Queensland, and acted as constructing engineer of fortifications in South Australia. Returning to railway work in 1879, he became resident engineer on the Great Northern Railway, South Australia, being in charge of the extension of the

line from Port Augusta to Oodnadatta. On the retirement of Mr. Mais in 1888 he was appointed to succeed him as Engineer-in-Chief, South Australia, and he held that office for 20 years, being responsible for all harbours, jetties, and lighthouses, and many other public works, including the Outer Harbour, Adelaide, the Happy Valley waterworks, and the Barossa waterworks. He was Chairman of the South Australia Supply and Tender Board from 1895 to 1899, and served as a Commissioner of the South Australian Railways from 1909 to 1916. He was appointed Chairman of the Adelaide Municipal Tramways Trust at its inception in 1907, and held that office until 1922, when he finally relinquished public duties. Companionship of the Order of St. Michael and St. George was conferred on him in 1909.

He was elected a member of The Institution in 1888, and served as a representative Member of the Council in Australia from 1908 to 1910. He was a member of the American Society of Civil Engineers, and a Past-President of the Public Service Association of South Australia.

He married in 1877 Mary Bonson, daughter of Mr. Sunter and is survived by his widow, a son, and a daughter. He died at his residence in Rose Park, Adelaide, on the 11th April, 1928, after a short illness.

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