

and construction of the Coolgardie Water Supply and other works. From 1903, he practised in conjunction with Mr. J. D. Elliot and his son, Mr. F. Gilbert Carruthers. He died on the 2nd September, 1914, aged 78.

Mr. Carruthers was elected an Associate of The Institution on the 9th January, 1866, and was transferred to the class of Members on the 16th May, 1871.

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ROBERT KAYE GRAY died from heart failure at Brighton on the 23rd April, 1914, in his sixty-third year. Born in Scotland in June, 1851, the eldest son of the late Mr. Matthew Gray, of Milbrae, Lanarkshire, he received his early education at Dollar and Greenock, coming to London in 1865 to study at University College School and University College, and completing his education at the Lycée Bonaparte, Paris, in 1869. The following year he joined the staff of the late Sir Charles Bright, and was employed in laying a system of telegraph cables connecting the West Indian Islands with Florida and Panama. From Panama he was invalided home, but shortly afterwards was engaged under his father on a cable-laying expedition between Gravelines and Bordeaux during the Franco-Prussian war. In 1872 he acted as Electrician-in-Chief to the India Rubber, Gutta Percha and Telegraph Works Company at Silvertown, in connection with the construction of the Direct Spanish Company's cable between the Lizard and Bilbao, as well as in the laying of a cable for the French Government between Marseilles and Algiers, under the late Mr. F. C. Webb, M. Inst. C.E. In 1874 he took charge of cable-laying expeditions on the West Coast of South America from Valparaiso to Callao, the laying of a second and third cable between Marseilles and Algiers, and the establishment of a submarine cable system for the Mexican Telegraph Company and the Central and South American Telegraph Company across the Gulf of Mexico on the one hand, and on the other between Callao (Peru) and Salina Cruz (Mexico), the two individual systems being connected by land line across the isthmus of Tehuantepec, Mexico. He next superintended the manufacture and laying of cables for the Spanish National Telegraph Company between Spain and the Canary Island, and thence, under French Government subsidies, to St. Louis and Dakar (Senegal).

It was in connection with the Spanish cable to Bilbao that Lord Kelvin's deep sea sounding apparatus was first turned to practical

account. The experience of its value gained on this expedition led Gray to insist on a complete submarine survey being made before any cable was laid by the Silvertown Company, and this is now the common practice. He also introduced the present system for landing cables ashore with the aid of a number of india-rubber balloon buoys attached to the cable at intervals as it was paid out into the water. Robert Gray and the Silvertown Company took a leading and very useful part in promoting the cause of the ultimately achieved "All-British" Pacific Cable. Indeed, Gray's evidence to the Committee appointed to inquire into the merits of the scheme did much towards its realization.

On the death of his father, in 1902, Robert Gray became Managing Director to the Silvertown Company, his younger brother, Mr. M. H. Gray, thereupon succeeding him as Engineer-in-Chief. Robert Gray continued to be Managing Director until failing health compelled him to resign only a year before his untimely death. His activities were by no means limited to telegraphy; on the contrary, he identified himself energetically with most of the multifarious manufactures of his firm, and notably with the Palmer cord pneumatic tyres for cycles, motor-cars and aeroplanes. He was also a director of the Cuba Submarine Telegraph Company, the Spanish National Telegraph Company, the West African Telegraph Company and the South American Cable Company.

Although of a singularly modest and retiring disposition, devoting the greater part of his energies to the Company with which his family had always been closely associated, Robert Gray found time to do a great deal of useful work in a quiet, unpretentious way in various other directions partly associated with his profession. He was a member of council, and twice filled the office of President of the Institution of Electrical Engineers, the duties of which he discharged with distinction and efficiency, especially on the occasions of the Gilbert Centenary Celebrations at Colchester, the society's visits to Italy and St. Louis, and the International Telegraph Conference in London. He was also a Fellow of the Royal Geographical Society, a member of council of the Royal Society of Arts, and a member of the Board of Visitors of the Royal Institution. He rendered valuable service on the Seismological Committee of the British Association and on the Engineering Standards Committee, and was Chairman of the Executive Committee of the Imperial College of Science and Technology, besides taking a very active part on the Board of the National Physical Laboratory. He was also a member of the Executive Committee of the London Territorial Force Association.

Robert Gray was a man of high character, integrity and uprightness: honesty of purpose was his guiding principle. By those who knew him intimately he will always be remembered for his kindly and genial nature and his readiness to lend a helping hand in any case that seemed to him really worthy. He was unfailing in his generosity to many good causes, and in particular to hospitals and charitable institutions, especially those devoted to the welfare of seamen, with which he was associated as a governor or in other ways. For his services to the French, Spanish and Portuguese Governments he received several decorations.

Mr. Gray was elected a Member of The Institution on the 4th March, 1890.

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ALBERT GROTHE, born in Westphalia on the 4th April, 1841, died in Mexico on the 19th August, 1914. He was educated at Utrecht, Holland, and after serving in the Dutch Army, abandoned a military career for engineering. In 1869 he was employed as a contractor's engineer on the construction of bridges on the St. Petersburg-Moscow railway, and subsequently on the erection of the first Tay Bridge. In 1879 he became Manager of the Tharsis copper mines in Spain, and his subsequent career was devoted definitely to mining, with the exception of some years spent on irrigation work in Idaho. On leaving Spain he went to Mexico, where, after managing mining properties and introducing various new processes, he started consulting practice in partnership with Mr. H. F. Carter.

Mr. Grothe was elected a Member of The Institution on the 6th March, 1883.

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JOSEPH HALL, born at Hazlewood, Yorkshire, on the 13th February, 1851, died on the 7th May, 1914. He was trained first for architecture and later for engineering, and in 1871 joined the staff of the Borough Engineer of Leeds, where he remained 10 years. In 1881 he became Surveyor of Torquay, where he carried out sea defences, a pier and gardens, and other public works. In 1890 he was appointed Borough and Water Engineer of Cheltenham, in which capacity he was responsible for river improvements, water-supply extension, parks, public buildings, and many other works, resigning his office in 1902. In the following year he received the appointment of Executive Engineer to the Municipality of Bombay,