

1859 he was employed by Mr. John Abraham, for whom he designed machinery for the manufacture of ammunition and later erected the Adderley Park Rolling Mills and Metal Works. On the transfer of this business to the Birmingham Small Arms Company, Mr. Bayliss became managing director of that establishment, retaining the position until 1889, when he founded the King's Norton Metal Company. He designed and erected improved machinery for metal-working, ammunition-making, etc., and laid out important extensions of the works at Abbey Wood, Kent. He was the inventor of the solid drawn cartridge case and laid down plant of his own design for its production at Spandau, Erfurt and Danzig in 1872. He took an active part in municipal, county and social work.

Mr. Bayliss was elected a Member of The Institution on the 2nd December, 1884.

HENRY JOSEPH BUTTER, born at Plumstead in 1835, died in London on the 9th November, 1914. He was apprenticed at Woolwich Dockyard in 1850, and was transferred to the Royal Carriage Department, Woolwich Arsenal, in 1856, as Chief Draughtsman. In 1868 he was promoted Constructor, and in 1873 he became Manager of the Department, retaining this position until 1890, when he was obliged to retire owing to injuries sustained in an accident which occurred during his work. Under his management the department underwent considerable development, iron and steel supplanted wood in construction, and machinery for working heavy guns was introduced. Mr. Butter invented many improvements in gun-mountings,¹ especially the hydraulic recoil cylinder, and organized the corps for the maintenance and inspection of ordnance machinery.

Mr. Butter was elected a Member of The Institution on the 5th April, 1881.

JOHN CARRUTHERS was born in Inverness on the 20th June, 1836. He was a son of the late Mr. Robert Carruthers, LL.D., and was educated at Christ's Hospital and the Inverness Academy. He began his professional career under Mr. Roswell G. Benedict, then Chief Engineer of the Great Western Railway of Canada, and subsequently was employed on the survey and construction of railways in Michigan, Illinois, and Minnesota, the Riga-Dunaburg

¹ Minutes of Proceedings Inst. C.E., vol. lxvii, p. 122.

line in Russia, and the construction of the Mauritius railways, where he occupied the position of Assistant Chief Engineer.

After a short stay in Egypt, he went to India in 1866 as Engineer to the Madras Irrigation and Canal Company, for whom he designed and carried out departmentally all the work on the Dhoor section of the main canal. On the completion of this work he returned to England, and shortly afterwards, in 1871, was appointed Chief Engineer to the Government of New Zealand, which had then determined to construct an extensive system of railways. Mr. Carruthers had to organize the whole system of construction, to design all the bridges, tunnels, and other works, to determine the main alignment of over 1,000 miles of railway and many miles of canals for the goldfields, and practically to train a staff of engineers from among the youth of the Colony. Among other interesting works constructed in New Zealand was an incline over the Rimutaka Range worked with Fell engines.¹

He returned to England early in 1879, and commenced to practise on his own account, being still connected with the New Zealand Government as their Consulting Engineer in London, at first in conjunction with Messrs. Hemans, Falkiner and Tancered, and afterwards alone. In 1883 Mr. Carruthers was consulted by the Government of Venezuela in regard to the survey and construction of a railway from Puerto Cabello to Valencia. The line was laid out in accordance with his directions, and included an incline through the Trincharas Gorge, designed on the Abt system, which he described in a Paper² read before The Institution in 1888. The company formed in London for the construction of this railway wished Mr. Carruthers to prove his confidence in his estimate of the cost by taking part in the contract for its construction, which he did, and as managing partner in Venezuela, completed the line in accordance with the concession. In 1889 Mr. Carruthers went to the Argentine Republic to make an estimate for the construction of the Cordoba and North Western railway, and afterwards carried out the work as Manager for the contractors. On the completion of this work in 1891, Mr. Carruthers returned to London and resumed his practice, receiving again the appointment of Consulting Engineer to the New Zealand Government, which he retained until his death.

In 1893 he was appointed Consulting Engineer to the West Australian Government, in which capacity he advised on the design

¹ Minutes of Proceedings Inst. C.E., vol. lxiii, p. 50.

² *Ibid.*, vol. xcvi, p. 120.

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.

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