

the São Paulo Railway. Subsequently he acted as Engineer for the construction of Macahé and Campos Railway, and in 1877 he engaged in consulting practice in Rio de Janeiro, and was connected with the execution of many important public works in Brazil, including the Bahia and Minas Railway and a large steel bridge over the Parahyba at Commercio. In 1889 he returned to England on account of failing health, and resided in this country until his death on the 25th May, 1906, in his sixty-seventh year.

Mr. Welby was elected a Member of The Institution on the 1st February, 1881.

HENRY HARTLEY WEST, born at Salford on the 17th September, 1837, was a son of the Rev. F. A. West, President of the Wesleyan Conference in 1857, and a distinguished minister of that body. The subject of this notice commenced his engineering career as an apprentice to the late Mr. John Jones, Engineer, of Liverpool. In 1860 he was appointed Resident Engineer on the Gunpowder Works of Messrs. John Hall and Son, of London and Faversham, and two years later he became Manager to Messrs. Pearson, Dannatt and Krüger, Engineers and Shipbuilders, of Hull, occupying this position until the closing of their works consequent upon the extension of Hull docks in 1863. In December, 1863, he received an appointment as a surveyor on the administrative and technical staff of the Underwriters' Registry for Iron Vessels, in the Liverpool district, where he remained until 1867, when he was promoted to be Chief Surveyor in Scotland, with headquarters at Glasgow. He discharged the duties of this office with ability and success until March, 1875, when he was transferred from Glasgow to Liverpool as Chief Surveyor for the West and South of England, including London, being further promoted in the following year to be Chief Surveyor for the United Kingdom, an office specially created at this time. He retained this responsible position until the amalgamation of the Underwriters' Registry for Iron Vessels with Lloyd's Register of British and Foreign Shipping in 1885. Mr. West then decided to engage in independent practice as a consulting engineer and naval architect in Liverpool, where his long and well-established reputation as a professional adviser and expert in engineering and shipbuilding questions, as well as his intimate acquaintance with shipowners, brought him an extensive professional connection.

He was consulted upon, and was responsible for, the distribution of material and the scantling arrangements to provide the requisite strength in some of the largest steamers afloat. His technical skill was frequently requisitioned in connection with important engineering matters and as an arbitrator his judgments were invariably accepted. In the question of mechanical road-traction he took exceptional interest, and at the request of the Self-Propelled Traffic Association he consented to act as one of the judges of their road trials. He was also one of the delegates appointed to investigate and report upon the development of motor traction in France.

Mr. West served on the Councils of the Institution of Mechanical Engineers and the Institution of Naval Architects, and was a member of other technical societies, to whose proceedings he was a frequent and valued contributor. In 1904 his Paper on "The Tonnage Laws and the Assessment of Harbour Dues and Charges"¹ was read before The Institution.

Mr. West was elected a Member of The Institution on the 1st December, 1885.

GEORGE ROBERT BALE, born in London on the 28th February, 1868, obtained his practical training with a firm of steam-yacht and launch builders and engineers at Hammersmith, from 1883 to 1890. He then entered the drawing-office of Messrs. John I. Thornycroft and Company, of Chiswick, and remained with them nearly 15 years, during which period he was occupied on the design and trial of high-speed engines and machinery for torpedo-boat destroyers and other craft built and engined at the Chiswick works. Continued ill-health obliged him to give up active work early in 1905, and he died at his residence at Camberley, Surrey, on the 17th September, 1906, aged 38.

Mr. Bale was the Author of a work in two volumes entitled "Modern Ironfoundry Practice," and he frequently contributed articles on marine engineering subjects to the columns of the technical press. He was an Associate Member of the American

¹ Minutes of Proceedings Inst. C.E., vol. clvii, p. 1.