

him, and among the undertakings on which he was engaged during the next ten years may be mentioned the drainage of Chatham, Romford and Cowes, the water-supply of the last-named town, and the estimates for the main-drainage works of the Metropolis. In 1860 he entered into partnership with Mr. Frederick Beesley, an association which lasted for thirty years. The principal works carried out by the firm of Gotto and Beesley during that period were the drainage of Rio de Janeiro, Seaford, Trowbridge, Evesham, Huyton and Roby, Redditch, Brentford and Cheshunt; and the drainage and water-supply of Campos (Brazil), Oswestry, Leominster and Cinderford.

On the expiration of the partnership in 1890, Mr. Gotto assumed the position of General Manager of the Rio de Janeiro City Improvements Company, Limited, which post he held until his death at Albany Road, St. Leonards-on-Sea, on the 27th February, 1897, at the age of seventy-five. Mr. Gotto resided at the Logs, Hampstead, and was a Justice of the Peace for Middlesex. He was elected an Associate on the 13th January, 1863, and was transferred to the class of Members on the 13th December, 1870.

WILLIAM WILSON HULSE, born at Amber, Derbyshire, on the 19th June, 1821, was the second son of the late Mr. Joseph Hulse, cotton-spinner, and it was at the mechanics' shop in connection with his father's mill that he and his cousin, Joseph (afterwards Sir Joseph) Whitworth,¹ first obtained a knowledge of engineering work. After being educated at King's College, London, he was apprenticed at an early age to his cousin, who had established the Whitworth works in Chorlton Street, Manchester. He remained connected with the firm for twenty-two years, ultimately becoming managing partner with Sir Joseph Whitworth. During that period he devoted special attention to the design of machine tools and to the improvements in ordnance and small arms with which the name of Whitworth became identified, and it was he who initiated the hollow frame now universally adopted in the manufacture of machine tools.

When in 1864 the firm of Joseph Whitworth and Co. was converted into a limited company, Mr. Hulse commenced to practise on his own account as a consulting engineer in Manchester, and gained considerable reputation in that capacity. On the retire-

¹ Minutes of Proceedings Inst. C.E., vol. xci. p. 429.

ment of his brother, Mr. J. S. Hulse, from business in 1881, he took over the Ordsal Works, Manchester, and under the style of Hulse and Co., re-designed and brought up to date the machine tools for which he became so well known. He also introduced many improvements, some of which were referred to in his Paper¹ read before the Institution in May, 1886, for which he was awarded a Watt medal and a Telford premium. On the occasion of the reading and discussion of that communication, Sir Frederick Bramwell, who was then President, said that so thoroughly had the Author kept himself in the background that, had it not been for Mr. Hulse's great reputation, no one who had listened to his Paper could have gathered that he was a tool-maker and was commercially interested.²

Mr. Hulse died at his residence, The Grove, Withington, near Manchester, on the 20th March, 1897, in the seventy-sixth year of his age. In addition to his immediate work he acted as one of the British judges at the Philadelphia Exhibition of 1876 and at other exhibitions. He was elected a Member on the 21st May, 1867.

HENRY GEORGE CLOPPER KETCHUM, whose name will remain associated with the important engineering undertaking of the Chignecto Ship Railway, was born at Fredericton, New Brunswick, on the 26th February, 1839, and was educated at the Collegiate Grammar School in that town. Early in 1854 he entered King's College University, New Brunswick, where he studied engineering under Mr. Thomas McMahon Cregan, and obtained the first diploma for civil engineering granted by that University. He then passed the Government examination for deputy land surveyors, but failing to find employment in that branch of the service, he acted for a time as a telegraph operator. In August, 1856, he became an assistant to Mr. Alexander Luders Light, who was then engaged in carrying out, for the Government of New Brunswick, a line of railway from St. John on the Bay of Fundy to Shediac on the Gulf of St. Lawrence. He served under Mr. Light four years, at first as a draughtsman, and then as an assistant engineer on this line, which was at that time called the European and North American Railway but is now known as the Intercolonial Railway of Canada. Mr. Ketchum was thus, at the outset of his career, associated with an engineering enterprise in

¹ Minutes of Proceedings Inst. C.E., vol. lxxxvi. p. 120.

² *Ibid.*, vol. lxxxvi. p. 148.