of a portion of these works, accompanied by drawings, was presented to the Institution of Civil Engineers in the Session 1842,[1] and for it Mr. Casebourne received a Telford Premium of Books.[2] In 1845 he removed to the locality now so well known as West Hartlepool—then a mere hamlet—to undertake the Resident Engineership of the Harbour and Docks constructed there; and since that period his name has been intimately connected with all that related to the port, harbour, and town of West Hartlepool. In 1850 he submitted to the Institution a Paper[3] descriptive of a float, or fixed platform, which he had used for submarine blasting in the bay of Hartlepool, and which was stated to have answered its purpose extremely well. On the incorporation of the Commissioners of West Hartlepool in 1854, he was one of the original Commissioners appointed under the Towns Improvement Act; and he continued to fill the office of Commissioner up to the period of his decease. He was for some time Chairman of the Board, only resigning that appointment in favour of Mr. R. W. Jackson (Assoc. Inst. C.E.) a week or two before his death. He also for a short time represented the West Hartlepool town interest in the Pier and Port Commission; but on the resuscitation of the Refuge Harbour question, he retired from that office, in order that he might not sit in judgment upon his own, amongst other competing plans. At the West Hartlepool Improvement Board, Mr. Casebourne was a regular attendant. He was also for many years a Vice-President and Life Member of the Local Literary and Mechanics' Institute.

Mr. Casebourne was elected an Associate of the Institution of Civil Engineers on the 12th of February, 1828, and was transferred to the class of Members on the 26th December, 1837. His decease occurred on the 2nd of January, 1864, in the sixty-sixth year of his age. He was a careful, conscientious man, had a good knowledge of the practice of Civil Engineering, and very deservedly, acquired the confidence of all with whom he was brought into contact.

MR. JOSEPH GIBBS was the youngest son of a mill-owner and manufacturer in Staffordshire, where he was born in the year 1798. His uncle was mineral agent to the Duke of Devonshire, and among the mines of the Derbyshire hills Mr. Gibbs first acquired a taste for engineering operations and geological research. He then visited Holland, and was engaged to superintend some hydraulic works in the Dutch colonies; and he resided for some time at Demerara, Berbice, and other places in the West Indies. On his return to England he associated himself with an excellent

[1] *Vide* Minutes of Proceedings Inst. C.E., vol. ii. (1842), p. 52.
[2] *Ibid.*, vol. ii. (1843), p. 6. [3] *Ibid.*, vol. x., p. 293.

and ingenious mechanic, Mr. Smart, of Lambeth, and while with him, he superintended the erection of several extensive corn and saw mills in the neighbourhood of London. He soon after completed and patented a series of inventions for sawing and cutting wood, metal, and stone ; and he established some extensive works at Crayford Mills, in Kent, and also in London for their development. Among the various mechanical inventions contained in these patents was that now well-known and used, called in Holtzapffel's work, " Gibbs' elbow joint." This invention is now applied in many ways in the construction of machine tools and other mechanical contrivances ; it consists in giving to a cutting point revolving at a high velocity, the capability of being conducted in every direction, and any pattern can thus be engraved in copper plates, and statues in marble, in relief, and the round can thus be copied with mathematical accuracy. The chief purpose to which this series of ingenious inventions was applied practically, was to the construction of inlaid floors. At Buckingham Palace, at Apsley House, at Windsor Castle, at the Duke of Northumberland's residence, Sion House, and other places, floors were laid down composed of an infinite number of pieces of wood of every kind and shape, forming the most elaborate designs, each piece being cut out and made accurately to fit its fellow, and to be secured with a tongue, by this machinery ; the surfacing and polishing only being done by hand. These floors are now in precisely the same state as when they were first laid.

For many years Mr. Gibbs was engaged in erecting machinery, &c., in England, Ireland, and Holland, for manufacturing purposes, and for lifting water. Having commenced his career in a Dutch colony, and associated with Dutch Engineers, his attention was early turned to the best method of draining the great lake called the Harlemmeer Meer ; but some time elapsed before he could persuade the Dutch authorities that steam power was better than wind for the purpose of draining this inland sea. Eventually the Dutch Commissioners, after visiting the great pumping establishments of this country, arrived at the conclusion that Mr. Gibbs's views were correct ; and he and his partner, Mr. Arthur Deane, were commissioned by the Dutch Government to execute the work. Engines of a novel and ingenious kind, specially adapted for the peculiarities of the undertaking, were constructed at the Hayle Foundry, Cornwall ; and ingeniously overcoming great difficulties, the whole of the water of the Meer was lifted within the time stipulated. Commercially this work was a great success ; the country was congratulated, and the Commissioners and Engineers were complimented in a speech from the throne, and the site of the Harlemmeer Meer is now one of the most fruitful and best cultivated portions of Holland.

Having constructed some mineral railways, and attempted on an extensive scale the scheme of running carriages, propelled by steam, on common roads, Mr. Gibbs turned his attention to the construction of passenger railways; among his first designs were the present Great Northern Railway, and a line from London to Brighton; for the first portion of the latter, as far as Croydon, his Company obtained a Bill, and he constructed the present line to that place. He had surveyed one of the numerous competing lines to Brighton, but, after a severe parliamentary contest, the present line was adopted on the advice of Colonel Alderson. In order to avoid an expensive opposition before the Committees of the House, the Croydon Railway Company purchased the old Croydon Canal; and in the endeavours to use the land so obtained, great difficulties of locality were encountered, and a uselessly steep incline was surmounted, which might have been avoided by following the evident course of the Ravensbourne. The Bill for the Great Northern Railway was thrown out on the second reading; some years later, Mr. Gibbs re-surveyed the line, but he was again unsuccessful. In 1844 the scheme was again brought forward, as the London and York Railway; eventually a Bill was obtained for it in a modified form, under that title, and was afterwards changed to the present, the original title of 1836.

Mr. Gibbs gave evidence before Parliamentary Committees upon nearly all important scientific inquiries, and he generally published his opinion upon them *in extenso*. He is also the author of an excellent book on the "Cultivation of Cotton." He was during his life a great traveller, having visited nearly all the countries of Europe, Asia Minor, Egypt, the East and West Indies, Australia, and New Zealand. He made several interesting geological and other surveys, and throughout his professional career he took great interest in the manufacturing arts, with the theory and practice of which he was well acquainted, especially in reference to textile fibres, many processes and machines invented by him being now in use. He had a high appreciation of the beauties of Nature, and he was so good an artist, that had not his predilections been for engineering, he would probably have practised the art of painting as a profession. He joined the Institution of Civil Engineers, as a Member, on the 6th April, 1852, and was a frequent attendant at the Meetings, taking a prominent and useful part in the discussions, when the expression of his opinions and the results of his practical experience, were always received with great respect by all the leading Members of the profession, by whom he was regarded with feelings of esteem and confidence. He was a warm-hearted, kindly man, believing and trusting everybody, of unbounded generosity, which was too often imposed upon, to the ultimate injury of his own circumstances, and the prospects of his

family. His decease, after a long and painful illness, occurred on the 11th February, 1864, in the sixty-sixth year of his age; and his memory will long live among all those Members of the profession who came in contact with him.

MR. GEORGE HURWOOD was the son of Mr. William Hurwood, a millwright resident at Bullingdon, near Sudbury. At an early age he was apprenticed to his uncle, Mr. Samuel Wright, a millwright having extensive practice at Ipswich, under whose tuition he became a very skilful workman, and was employed on some of the most important works in the district. He was so devoted to the mechanical art, that the chief portions of his leisure hours were occupied in constructing models of machines of great accuracy and beauty, one of which—that of a steam-engine—held for some years a prominent position at the Polytechnic Institution, London. In due time his recognized skill and industry had their reward, and in 1837 he was established at Ipswich, by some gentlemen of capital, in a foundry, as managing partner of the firm of Bond, Turner, and Hurwood, where there were constructed some good steam-engines, and the machinery for many corn and paper mills, &c.

At the period of the construction of the Ipswich Docks, he took much interest in the progress of the work, and was entrusted with the contract for the dock-gates, which he executed very satisfactorily. About the year 1850 his connection with the foundry ceased, and he established himself as a Consulting Engineer at Ipswich, and eventually he became, on the resignation of Mr. James Jones, the Resident Engineer of the Docks at that place, which post he held with great credit to himself and advantage to the port, until his decease, which occurred on the 26th of February, 1864.

He was at one period frequently employed by the Admiralty to conduct investigations on the probable effect upon tidal waters of projected railway and other works, and his judgment was highly respected.

He invented and patented several ingenious and useful mechanical contrivances, which have been extensively employed. He joined the Institution of Civil Engineers as an Associate April 5th, 1842, and was transferred to the class of Members February 27th, 1854. He was a frequent attendant at the Meetings, taking a useful part in the discussions, and he contributed two Papers entitled respectively "Description of a plan adopted for carrying off an Accumulation of Water, from the Warehouses, Cellars, &c. near the Wet Dock at Ipswich,"[1] and "On the

[1] *Vide* Minutes of Proceedings Inst. C.E., vol. ii. (1843), p. 183.