to South Africa to die; and after a long period of suffering and gradual exhaustion, he passed away at Wynberg on the 26th of May, 1893, at the comparatively early age of fifty-four.

Mr. Grier was greatly respected throughout the Colony, not only for the able and conscientious performance of his professional duties, but for the keen sense of justice and kindly feeling he displayed towards all with whom he was brought into contact. He was strongly interested and rendered constant assistance in Church matters. The calm fortitude and patience with which he bore the terrible sufferings of his last illness have been characterized as truly wonderful. He was elected a Member of the Institution on the 6th of March, 1883.

JOHN HEAD was born in Birmingham on the 11th April, 1839, and was educated in France. On leaving school he was engaged in that country as a bank clerk until his nineteenth year, when he returned to England and set up on his own account as a commission agent. He carried on a successful business in steam-gauges and other engine-fittings, and it was probably in connection with the sale of these that he first became acquainted with Mr. (afterwards Sir) William Siemens,[1] who was then agent for the Berlin firm of Siemens and Halske. In 1859 Mr. Head was engaged by Messrs. Siemens and Halske and in the following year was appointed personal assistant to Mr. William Siemens, who had a private engineering business. From that time he devoted himself absolutely to the work and interests of his employer, and if there is little or nothing to chronicle specially about him, it is because he sank his own personality entirely in that of Mr. Siemens. In 1868 Mr. Head took special charge of the furnace and metallurgical business, which some years later, and until William Siemens's death, he managed, as principal assistant. On the transfer of the business to Mr. Frederick Siemens—after the death of Sir William—Mr. Head was appointed general representative of the firm for England, France, Belgium, Spain, Portugal, the United States of America, and the Colonies and Dependencies of those countries. During the whole of his career he was actively engaged in this country and abroad in superintending the design, construction, and working of regenerative gas-furnaces applied to

[1] Minutes of Proceedings Inst. C.E., vol. lxxvii. p. 352.

various industries and especially to the manufacture of iron, steel and glass.

In the beginning of 1885 Mr. Head brought before the South Staffordshire Institute of Iron- and Steel-Works managers Mr. Frederick Siemens' system of heating by radiation. According to this system the heat resulting from combustion is utilized in two stages; in the first, when the heat is developed, free space is allowed so as to prevent the flame from coming into contact with solid substances, which disturb combustion and, being generally at a lower temperature than the flame, produce smoke. In the second stage, intimate contact takes place between the products of combustion and the regenerators of the furnace in which the heat is preserved for future use. In 1887 he read at the Sanitary Congress at Bolton a Paper[1] on the application of heating by radiation to Gas-Fired Steam-Boilers. Two years previously he had brought before the Iron and Steel Institute an invention of his own under the title of "A Modified Form of the Siemens' Old Type Gas-Producer; by means of which the Gases are enriched, and the by-products may be recovered."[2] In this arrangement the gas-producer is divided into two compartments, one to receive the hydro-carbons, the volatile constituents of the coal, and the other the carbonic oxide formed by the decomposition of solid carbonaceous matter, by means of a curtain-wall to separate the zone where the hydro-carbons are produced from that where carbonic oxide is formed. In the following year he presented to the same Institute a Paper[3] on "Blow-Holes in Open-Hearth Steel," in which he brought forward evidence to show that blow-holes and seedy boil were found in steel and glass melted by contact of the flame with the material treated, but were absent when heating by radiation of the flame was adopted.

In 1889 he read, in conjunction with Mr. Pouff, who at that time represented Mr. Frederick Siemens in Paris, a Paper, at a meeting of the Iron and Steel Institute,[4] on "A New Form of Siemens' Furnace arranged to Recover Waste Gases as well as Waste Heat," which was discussed in 1890. According to this arrangement, which is the invention of Mr. E. Biedermann, and Mr. E. W. Harvey, both on the technical staff of Mr. Frederick Siemens, a certain proportion of the waste products of combustion is supplied hot into the incandescent fuel of the gas-producer, and the carbonic

[1] Trans. Sanitary Institute of Great Britain, vol. ix. p. 336.
[2] Journal Iron and Steel Institute, 1885, p. 126.
[3] *Ibid*, 1886, p. 99.
[4] *Ibid*, 1889, p. 256, and 1890, p. 18.

acid contained in the waste products is thus converted into carbonic oxide, by which a considerable economy in fuel is realized. This necessitates having the gas-producer close to the furnace, which gas-producer further takes the place of the gas-regenerator in the original form of Siemens furnace, so that in the new form of Siemens furnace the gas-regenerators are suppressed, and the construction of the furnace simplified.

In 1886 Mr. Head was requested to read a Paper[1] on the "Manufacture of Glass and Steel on the Open-Hearth" before the Mechanical Section of the British Association at its Birmingham Meeting, and shortly before his death he presented to the Iron and Steel Institute "Some Notes on Puddling." For many years he had not been in the enjoyment of robust health; and he succumbed to an attack of pneumonia, after only six days' illness on the 14th July, 1893. Mr. Head was a Fellow of the Geological Society and was elected a Member of this Institution on the 5th of February, 1889.

FREDERICK MARGARSON HYNES was born on the 23rd of February, 1842. After serving a regular period of pupilage in the office of the late Mr. James John Berkley,[2] Chief Engineer in India to the Great Indian Peninsula Railway, he remained in the service of that Company as an Assistant Engineer, which post he held for six years. He was then promoted to Resident Engineer and placed in charge of a section of the line. During the two years he occupied that position the whole of the section was doubled, an undertaking which involved some important constructional works, as well as the maintenance of the existing line.

In July, 1873, Mr. Hynes retired from the service of the Great Indian Peninsula Railway Company and entered the Public Works Department of Victoria as an engineering and architectural draughtsman. After being engaged in that capacity for nearly five years he was appointed in January, 1878, Engineer in charge of the harbour, coast and river works of the colony. This post involved the design and execution of numerous works of importance, including lighthouses, piers, breakwaters and bridges. In August, 1890, at the recommendation of the Chief of the Department, the Office of Roads and Bridges was amalgamated

[1] Report British Association, 1886, p. 800.

[2] Minutes of Proceedings Inst. C.E., vol. xxii. p. 618.