Calendar of Industrial Pioneers.

November 12, 1902. William Henry Barlow died.—Appointed principal engineer of the Midland Railway in 1844, when thirty-two years of age, Barlow laid out the line from London to Bedford and was responsible for St. Pancras Station. He was also concerned with the Clifton Suspension Bridge, the second Tay Bridge, and the Forth Bridge. He was widely known for his scientific investigations of arches and beams, and in 1868 was made one of the committee appointed to investigate the applicability of steel to structures. He was a vice-president of the Royal Society, and in 1879–80 president of the Institution of Civil Engineers.

November 13, 1903. Josiah Vavasseur died.—One of the chief ordnance engineers of last century, Vavasseur invented in 1866 the copper rotating ring or band for projectiles of breech-loading guns, and subsequently did important work on the construction of built-up steel guns and on hydraulic mountings. In the Vavasseur mounting of 1877, the recoil was for the first time scientifically controlled by hydraulic buffers having a uniform resistance. The London Ordnance Works which he founded was in 1883 merged in those of Armstrong's at Elswick.

November 14, 1830. Henry Bell died.—The foremost pioneer of the steamboat in Europe, Bell, who was born at Torphichen, Linlithgowshire, on April 7, 1767, was apprenticed as a stone mason but afterwards became a shipwright and builder. In 1808 he became proprietor of a hotel and baths at Helensburgh on the Clyde and in 1811 ordered the *Comet.* In August 1812 this little craft began running between Glasgow and Greenock, and from this dates the beginning of steam navigation in Europe. The vessel was wrecked in 1820, but the engine was salved and is preserved in the Science Museum at South Kensington.

November 14, 1905. Robert Whitehead died.—The inventor of the automobile torpedo, Whitehead made his first torpedo in 1866 while holding a position in an engineering works at Fiume. Taken up first in 1868 by the Austrian Navy, experiments were carried out at Sheerness in 1870 and soon afterwards the torpedo was adopted by the British and other Governments.

November 15, 1839. William Murdock died.—Known principally for his discovery of lighting by coal gas and as the originator of a great industry, which in Great Britain alone consumes some 22,000,000 tons of coal per annum, Murdock was for many years the right-hand man of Boulton and Watt. He was first employed by them in 1777, and was sent to Cornwall to erect steam engines. In his house at Redruth in 1784 he experimented with a small locomotive and in 1792 lighted his house by gas. He was also a pioneer in the transmission of power by compressed air.

November 16, 1911. Engelbert Arnold died.—A notable contributor to the literature of electrical engineering, Arnold, after studying at Zürich, engaged in practical work in Russia. For a short time he was engineer to the Oerlikon works in Switzerland and from 1894 to 1911 held a chair at the Institute of Technology at Karlsruhe.

November 18, 1814. William Jessop died.—Trained as a civil engineer under Smeaton, Jessop was employed on some of the English canals, completed the West India Docks and constructed a railway in Surrey which was the first opened to the public in the South of England. E. C. S.

Societies and Academies.

LONDON.

Royal Society, November 2.—Sir Charles Sherrington, president, in the chair.—Lord **Rayleigh**: Polarisation of the light scattered by mercury vapour near the resonance periodicity. White light scattered at right angles by dense mercury vapour is to a first approximation completely polarised. Ultra-violet radiation of the mercury spectrum line λ2536, when examined immediately it enters mercury vapour in an exhausted vessel at room temperature, gives a scattered radiation which is slightly though definitely polarised. This polarisation has been observed to increase as the beam is filtered by penetration of a considerable depth of vapour. After penetration of 27·5 cm. of vapour the weaker polarised image had 60 per cent. only of the intensity of the stronger one, instead of 90 per cent. as at first. The radiation removed by the filtration appears to lie within a spectral range of about 1/100 Ångstrom.—G. P. **Thomson**: The scattering of hydrogen positive rays and the existence of a powerful field of force in the hydrogen molecule. At a pressure of less than 1/100 mm., hydrogen positive rays of 10,000 volts mean energy suffer considerable small-angle scattering in a distance of 15 cm. This scattering is 10-20 times greater than would be expected on theoretical grounds. There must, therefore, be a field of force in the hydrogen molecule at distances of the order of 10^{-8} from a nucleus which is much stronger than would be expected from the inverse square law. A subsidiary experiment throws great doubt on Glimme and Koenigsberger's "Stossstrahlen."—H. D. **Smyth**: A new method for studying ionizing potentials. Positive ray analysis is used to study the ions produced in a gas or vapour by the impact of slow-speed electrons of known energy. This requires that the density of gas be considerable where the energy of the impacting electrons is known, and as small as possible where the energy conditions are not known. In the case of mercury such a localisation of vapour density was obtained by using a unidirectional molecular stream similar to that employed in a mercury diffusion pump. Ions were produced by electrons from a hot filament, and after acceleration by a large electric field were analysed by a magnetic field. In this way the values of m/e were determined approximately. The experiments on mercury indicate the formation of doubly charged ions at 19 ± 2 volts. The series relations of the enhanced spectrum of mercury are not known, but analogy with zinc and cadmium suggests an estimate in agreement with the above value. The conclusion is that the double ions formed at this voltage are the result of two impacts. Experiments at higher voltages indicate formation by single impacts. More highly charged ions were present in such small quantities as to make their identification uncertain even at voltages as high as five hundred. It was also impossible to identify a singly charged diatomic molecule.—I. **Backhurst**: Variation of the intensity of reflected X-radiation with the temperature of the crystal. General agreement only is found with the theories of C. G. Darwin and P. Debye. Aluminium: Very marked decrease in intensity was observed with rise of temperature, and fair agreement with P. Debye's theory obtained for the (100) and (222) spectra. Carborundum: A special furnace was constructed for temperatures up to 960° C. and no deterioration of the crystal was observed. The decrease in intensity with rise of temperature was