Calendar of Discovery and Invention.

February 14, 1748.—The two great discoveries of Bradley were those of aberration and nutation. Both resulted from his attempt to determine the parallax of the stars. Aberration was discovered in 1727; he recognised nutation twenty years later, his discovery being made known in a letter dated Feb. 14, 1748, addressed to the Earl of Macclesfield. Bradley at that time was Astronomer-Royal, having succeeded Halley in 1742.

February 14, 1876.—In his attempts to transmit musical sounds by electricity, Alexander Graham Bell in 1875 devised a harmonic telegraph, in which reeds at the receiving end were set in motion by electro-magnets. It was an irregularity in the working of this which led Bell to the invention of the telephone. Elisha Gray had also been working at a telephone, and on Feb. 14, 1876, both filed applications for patents with the American Patent Office. It was found, however, that Bell's application had been received first, and a patent was granted him.

February 15, 1615.—Among the early works of interest to the engineer is "Les Raisons des forces mouvantes avec diverses machines . . ." of Salomon de Caus, the French architect. The author dedicated his work to Louis XI. on Feb. 15, 1615. It is in this work that he enunciated the theorem of the expansion and condensation of steam and his application of steam for raising water.

February 16, 1889.—Formally opened in March 1851, Owens College, Manchester, was referred to in 1858 by the *Manchester Guardian* as "a mortifying failure." Its later success was largely due to Roscoe, who had been appointed to the chair of chemistry in 1857. Thirty years later he retired, and in an address dated Feb. 16, 1889, presented to him by his former students, it was said: "For upwards of thirty years you have had the control and direction of the chemical department of the Owens College. You leave it the best-organised and best-equipped school of chemistry in the kingdom, numbering its students by hundreds, and the acknowledged model of the many similar institutions which the success of your own school has called into existence." Roscoe, like Playfair in after life, entered Parliament and was one of the recognised spokesmen for science in Great Britain.

February 17, 1753.—Stephen Gray, a pensioner of the Charterhouse, Dufay, a French military officer, the Abbé Nollet, and Sir William Watson, all transmitted electricity along wires, but the earliest distinct proposal for an electric telegraph is that contained in a letter signed "C. M." in the *Scots Magazine* for Feb. 17, 1753. By some "C. M." is believed to stand for Charles Morrison; by others for Charles Marshall, both of whom lived at Renfrew. The suggested telegraph had an insulated wire for each symbol; the receiver noted the attraction by a ball attached to the wire of a strip of paper about ⅛ inch below it, on which was the symbol.

February 19, 1878.—During the summer of 1877, while engaged in the invention of a telegraph repeater for increasing the speed of sending telegrams, Edison used a metal disc with paper on it on which an embossing point worked by an electro-magnet indented dots and dashes. By reversing the operations and revolving the disc rapidly, musical notes were obtained. This suggested to Edison a means of recording and reproducing the sounds of the human voice, the first sketch of the phonograph being made on Aug. 12, 1877, and a patent being obtained on Feb. 19, 1878. E. C. S.

Societies and Academies.

LONDON.

Royal Society, Feb. 3.—**W. A. Bone, R. P. Fraser, and D. A. Winter**: The initial stages of gaseous explosions. Part 1—Flame speeds during the initial 'uniform movement.' A gaseous explosive mixture is ignited at the *open* end of a horizontal tube 2·5 cm. in diameter. So long as the initial flame speed does not exceed about 4000 cm. per sec., there is a definite initial 'uniform movement,' the speed of which, under standard conditions of experiment, was nearly always fairly constant. But with initial flame speeds exceeding such limits, in ethylene-oxygen and acetylene-oxygen mixtures, the flame speed was continuously accelerated *ab initio* until detonation is set up, just as though the explosive mixture had been fired near the *closed* end of the tube. In hydrogen-oxygen mixtures, whilst the uniformity of the initial movement was still maintained, its speed tended to vary. In certain circumstances, a slow 'uniform movement' of flame can be developed in an explosive mixture after an initial period of continuous acceleration. Thus the speed at which a slow uniform flame movement can travel through an explosive mixture cannot be regarded as a physical constant of it, in the same sense as its rate of explosion (that is, detonation).

W. A. Bone, R. P. Fraser, and D. A. Winter: The initial stages of gaseous explosions. Part 2—An examination of the supposed law of flame speeds. The mixtures used for the tests have included several complex hydrocarbon and hydrogen-oxygen mixtures, in which the hydrocarbon has been either acetylene, ethylene, or methane; also a series of complex methane-hydrogen-air mixtures, all containing excess of combustible gas, have been examined. When ethylene, or methane was the hydrocarbon used, and the primary mixtures both contained excess of combustible gas, the effect of successive additions of the primary hydrogen-oxygen mixture to the primary hydrocarbon-oxygen mixture (both having the same initial uniform flame speed) is progressively to depress the initial uniform flame speed of the resulting complex mixture, until it refuses any longer to propagate flame. It therefore follows that Payman and Wheeler's 'law of flame speeds' is not generally applicable to gaseous explosions.

A. Egerton and S. F. Gates: On detonation of gaseous mixtures of acetylene and of pentane (1). The conditions for detonation to occur in the same place in a tube of certain dimensions have been investigated for acetylene and for pentane mixtures of definite composition. Detonation appears to take place slightly ahead of the combustion front. The 'anti-knock' compounds, lead tetraethyl and diethylselenide, did not affect the position of detonation at ordinary initial pressures and temperatures.

A. Egerton and S. F. Gates: On detonation of gaseous mixtures at high initial pressures and temperatures (2). Detonation in acetylene and in pentane mixtures at high initial temperatures (230° C.) and pressures (10 atmospheres) has been investigated photographically, using a steel tube fitted with glass windows. Increase of initial pressure engenders earlier detonation up to a certain limit, when further increase makes very little difference. At a given initial pressure, rise of initial temperature appears to render detonation slightly later. Lead tetraethyl does not affect the position of detonation at high pressure either at normal initial temperature or at 23° C.

W. A. Bone and A. Forshaw: Studies upon catalytic combustion. Part 5.—The union of carbonic oxide and other gases with oxygen in contact with a fireclay