Calendar of Discovery and Invention.

March 13, 1759.—In 1757, Clairaut began his long calculations on Halley's Comet, in which he was afterwards assisted by Lalande. In Nov. 1758 he announced that the comet would reach perihelion on Apr. 13, 1759, though its arrival might differ from this date by so much as a month. The comet reached perihelion on Mar. 13, 1759, the accuracy of Clairaut's prediction being regarded as a brilliant triumph of Newton's theory.

March 13, 1781.—Herschel's great review of the heavens began in 1775 and was carried out mainly with telescopes constructed by himself. On Mar. 13, 1781, while examining some small stars, he discovered what he thought was a comet. Further observations and calculations by himself and others, however, proved the newly discovered body to be a planet to which the name Uranus was given by Bode.

March 14, 1794.—Cotton has been cultivated from the dawn of history. It is mentioned in the Rig Veda hymn, composed fifteen centuries before the Christian era, and the roller gin for cleaning cotton was evolved in India 300 B.C. Roller gins, however, are not suitable for cleaning the ' upland ' cotton grown in America, where all cotton was cleaned by hand until the invention of Whitney's gin, patented on Mar. 14, 1794. In 1791, 189,500 pounds of cotton had been exported from the United States; nine years after Whitney's invention the amount exported had grown to 41,000,000 pounds.

March 15, 1816.—The national standard of length in Great Britain up to 1824 was the yard of Elizabeth, kept at the Exchequer, which, said Baily, was such that " a common kitchen poker filed at the ends by the most bungling workman would make as good a standard." Through a resolution of the House of Commons on Mar. 15, 1816, the Royal Society initiated experiments to find the length of a pendulum swinging seconds, one of the objects being to compare British and French standards, and these were the beginning of experiments spread over many years which gave us our present standards.

March 17, 1876.—Kelvin, writing to Andrews of Belfast on Mar. 17, 1876, said : " I have to-day been seeing an exquisite electrical experiment, quite a first-class discovery by Dr. John Kerr." What the discovery was Kerr explained to the British Association that year when he showed that when polarised light is reflected from the end of the core of an electro-magnet, the plane of polarisation is rotated under the influence of the magnet in a direction opposite to the conventional direction of the current. These experiments led to the fundamental researches on electro-optics and magneto-optics of later physicists.

March 18, 1700.—The inauguration of an Academy of Sciences at Berlin, after the plan of the Royal Society of London, was decided upon on Mar. 18, 1700. On July 11 the King, Frederick I., signed the letters patent which made it a State institution and Liebnitz was proclaimed president for life. The King, it is said, gave his consent to please his wife. In 1744 the Academy was re-organised by Frederick the Great, who attracted Euler, Lagrange, and other eminent foreigners to Berlin.

March 19, 1702.—In the *Post Man* of this date appeared an advertisement to the effect that Captain Savery's engine, which raises water by the " force of fire with less expense than any other forces of horses or hands " could be seen at his " Workhouse in Salisbury Court, London, against the old Playhouse." This ' Workhouse,' the first steam-engine factory in the world, was close to St. Bride's Church, Fleet Street.   E. C. S.

Societies and Academies.

LONDON

Royal Society, Mar. 3.—W. L. Bragg and J. West : The structure of certain silicates. Each series of silicates classified together as a mineral species, although with wide variation in chemical composition, is regarded as based on a characteristic type of oxygen assemblage. A number of structures are based on cubic or hexagonal arrangements of closest packing of oxygen atoms, the metal and silicon atoms being inserted into this framework. The dimensions of the unit cell are related to the fundamental spacings of this simple background of oxygen atoms, on which the complex pattern formed by the other atoms is embroidered. Closest-packing is found for an extended series of compounds, ranging from BeO, Al_2O_2, $BeAl_2O_4$, and $MgAl_2O_4$ to cyanite Al_2SiO_5, olivine $(Mg, Fe)_2SiO_4$, monticellite $MgCaSiO_4$, and the chondrodite $[(MgOH)_2Mg_3(SiO_4)_2]$ group. The arrangement of oxygen atoms is in general more complex, closest-packing being an exceptionally simple case, but the packing of oxygen atoms seems to remain the predominant feature of the structure.

M. C. **Johnson** : Doppler effects and intensities of lines in the molecular spectrum of hydrogen positive rays. The luminosity of hydrogen positive rays was examined with apparatus capable of maintaining constant electrical and gas conditions over very long exposures. About 150 lines present in the positive ray spectrum are listed, and also about 100 strong lines conspicuous by their absence. Five lines with Doppler components not before recorded are found, including one displacement to the red. From measurement of the Doppler components in both atomic and molecular spectra, evidence as to the carriers of both is found. Certain lines are carried by H_2, and only one is probably carried by H_3. The displaced Balmer lines are due to free atoms, not to those newly dissociated. The Fulcher characteristics of the secondary spectrum weaken towards the violet, as also does the ratio of displaced to undisplaced intensities in the Balmer lines. The majority of the secondary lines are due either to radiation or to the impact of positive ions on stationary molecules which have not been recently ionised.

E. **Mallett** : A vector loci method of treating coupled circuits. If in the first of two coupled circuits an E.M.F. of constant amplitude and variable frequency is introduced, the currents in the primary and secondary respectively may be written $i_1 = e/Z'$ and $i_2 = e/Z''$, where Z' and Z'' are complex impedance operators. The loci of these impedances, as ω is varied, have definite geometrical forms ; Z'' is a parabola, Z' a cissoid. Current loci are inverse of impedance loci. When the circuit condensers are varied instead of ω, the loci degenerate into straight lines and circles.

H. S. **Allen** and I. **Sandeman** : Bands in the secondary spectrum of hydrogen. A band in the secondary spectrum of hydrogen at higher pressures, recently described, comprising a P, Q, and R combination, was attributed to triatomic hydrogen. It has since been found to be one of a considerable system of bands which occur in groups, the bands of a group being spaced out at intervals of very nearly 92 wave-numbers, the spacing being in some cases approximately constant and in others conforming to a quadratic law. In some cases the lines of the groups are enhanced in the spectrum of the arc in hydrogen at higher pressures. The bands must originate in molecules with large moments of inertia, probably active or triatomic hydrogen.

C. G. **Darwin** and W. H. **Watson** : The constants of