Calendar of Discovery and Invention.

December 25, 1758.—Newton having stated the principles by which the orbit of a comet could be determined, Halley traced the paths of twenty-four comets which had appeared between 1337 and 1698. Finding three tracks closely resembling one another, he was led to the conclusion that the so-called three comets were but different appearances of the same comet at intervals of about 75 or 76 years. Further investigation, in which he allowed for the retarding influence of Jupiter on the comet, led to the prediction of this comet's return. He knew he could not live to see it, but he wrote, "If it should return, according to our predictions, about the year 1758, impartial posterity will not refuse to acknowledge that this was first discovered by an Englishman." As the time for its reappearance drew near, its orbit was recalculated and the comet was recognised on Christmas Day, 1758.

December 27, 1831. — Recommended by Prof. Henslow to Captain Fitzroy, who was about to set out in H.M.S. *Beagle* to survey Patagonia, Terra del Fuego, Chile, Peru, and some of the Pacific Islands, Darwin, then twenty-two years of age, joined the expedition as naturalist, and the *Beagle*, after being driven back twice by gales, finally left Devonport on her famous voyage on Dec. 27, 1831. The trip lasted nearly five years, the vessel reaching Falmouth on Oct. 2, 1836.

December 28, 1814.—It was while serving as a government civil engineer in the Corps des Ponts et Chaussées that Fresnel, on Dec. 28, 1814, wrote to a friend inquiring what was meant by the polarisation of light. The information obtained was quickly mastered, and from that time dates the beginning of his valuable studies in optics.

December 28, 1895.—On a building, at 14 Boulevard des Capucines, Paris, is a tablet commemorating the first public display of a kinematograph film by the Brothers Lumière on Dec. 28, 1895.

December 29, 1566.—Few men of science have been called upon to fight a duel, but Tycho Brahe's fight at Rostock must always remain of interest to astronomers. Tycho's quarrel with his adversary, Manderupius Pasbergius, is said to have originated in a difference of opinion respecting their mathematical acquirements. The duel took place on the dark evening of Dec. 29, 1566, Tycho then being twenty years of age. In the fight Tycho lost his nose, but, as Brewster remarked, "it was fortunate for astronomy that his more valuable organs were defended by so faithful an outpost."

December 31, 1839.—Weld's "History of the Royal Society" contains some interesting notes on Herschel's great telescope, and includes "The Herschelian Telescope Song," the "Requiem of the Forty-feet Reflector at Slough," written by Sir John Herschel, "to be sung on the New Year's Eve, 1839–40, by Papa, Mama, Madame, and all the Little Bodies in the tube thereof assembled." Three of the verses ran:

Full fifty years did he laugh at the storm,
And the blast could not shake his majestic form;
Now prone he lies, where he once stood high,
And search'd the deep Heavens with his broad bright eye.

There are wonders no living wight hath seen,
Which within this hollow have pictured been;
Which mortal record can ne'er recall,
And are known to Him only who makes them all.

Here watched our father in wintry night,
And his gaze hath been fed with pre-Adamite light;
While planets above him, in circular dance,
Sent down on his toils a propitious glance.

E. C. S.

Societies and Academies.

LONDON.

Royal Society, Dec. 8 (*continued from p. 902*).—F. H. **Constable**: Spectrophotometric observations on the growth of oxide films on iron, nickel, and copper. The reflecting power of the metallic films increased considerably on activation; this explains the brightening of the oxidation colours consequent on the oxidation of the metal. The phenomenon was imitated by oxidising a cylinder of metallic copper divided into four portions, burnished, sandpapered, and two electrolytically deposited. The brightness of the respective colour sequences were in the same order as the brightness of the metal surface on which they were produced. The colour sequence on copper showed strong reds and weak blues. This is attributed to the strong specific reflection of red light by metallic copper. The sequence of nickel was remarkable for the absence of red colour, only browns being visible, while the dark blue was of remarkable intensity. The effect is attributed to the specific absorption of nickelous oxide. The colours on iron are normal to blue, after which the absorption becomes so strong as to distort the sequence.

J. W. **Lewis**: An experimental study of the motion of a viscous liquid contained between two coaxial cylinders. Mathematical laws deduced by G. I. Taylor for the case when ratio of interspace (d) to radius (R_1) of the inner cylinder is small have been confirmed. When the outer cylinder is fixed, the expression for the critical velocity at which the laminar motion gives place to vortex motion holds for values of the ratio d/R_1 as high as 0·71, and for liquids the coefficient of viscosity of which varies from 0·006 to 0·018 C.G.S. The determination of the critical speed can be used for the measurement of viscosities. When $R_1 = 0{\cdot}26$ cm., and $R_2 = 0{\cdot}45$ cm., viscosities from 0·008 to 0·012 C.G.S. can be measured with certainty to within 1 per cent.

C. E. **Inglis**: Oscillations of a bridge caused by the passage of a locomotive. Mathematical methods are developed for predicting the state of oscillation set up when a given locomotive crosses a bridge at a specified speed. The author, as a member of a committee appointed in 1923 by the Department of Scientific and Industrial Research to investigate impact effects in railway bridges, had the results of practical experiment to point the way. Analysis is applied in the first instance to a long-span bridge where the state of oscillation is not sufficiently violent to stimulate spring movement in the locomotive. A more comprehensive analysis, in which bridge damping and inertia effects of the moving load are taken into account, is applied to the case of an actual bridge of 262½ feet span. Laboratory experiments with a model bridge and locomotive were also described.

G. R. **Goldsbrough**: Tides in oceans on a rotating globe. A method is developed by which it is possible to calculate the forced tidal oscillations in an ocean, bounded by two meridians, on a rotating globe. When the ocean depth is proportional to the square of the cosine of the latitude, the determination of the semi-diurnal tide is slightly simpler, and it is with this particular case that the paper is largely concerned. The method, in the case of the stated law of depth, permits of the determination of the critical depths at which synchronism with the semi-diurnal tide takes place. In an ocean bounded by two meridians 60° apart (which may be regarded as a representation of the Atlantic Ocean) the critical depth is not far from the mean depth of the Atlantic Ocean. The tides of that ocean may then be considered as arising from approximate synchronism.