Educational Topics and Events

CAMBRIDGE.—Dr. T. S. Hele, Master of Emmanuel College, Prof. J. H. Clapham, Sir F. G. Hopkins, Sir A. S. Eddington and Prof. E. J. Dent have been appointed delegates from the University to the tercentenary of Harvard College on September 16–18.

Prof. A. C. Seward, Master of Downing College, has been elected into an honorary fellowship at St. John's College.

Prof. E. V. Appleton, Jacksonian professor of natural philosophy, has been elected into a professorial fellowship at St. John's College. At King's College, Leslie Howarth, formerly scholar of Gonville and Caius College, has been elected Berry-Ramsay fellow of the College. Mr. Howarth was a Wrangler in Part II of the Mathematical Tripos 1933, and was awarded a Smith's Prize and the Amy Mary Preston Read Scholarship in 1935.

PROF. A. R. WADIA, secretary of the Inter-University Board, India, has sent us a copy of a pamphlet containing a "Bibliography of Doctorate Theses in Science and Arts accepted by Indian Universities from January, 1930" (The Bangalore Press, Bangalore City). It is not always realised that the D.Sc. and D.Litt. degrees of Indian universities are equal in standing to those of most universities in Great Britain and demand equal attainment or original work. In the chief universities, the D.Sc. may be taken by M.Sc.'s (in some cases, by M.A.'s in science) of three years' standing, by thesis; and similarly the D.Litt. may be taken by M.A.'s. Usually, there is a European, or other leading authority, who acts as one of the assessors of a thesis for such a higher degree. The Ph.D. degree may also be taken by thesis by M.A.'s of three years' standing. The number of theses of which the titles are given in the list just issued is as follows: Aligarh, Ph.D., 3. Allahabad, D.Sc., 7; D.Litt., 4. Benares, D.Litt., 4. Bombay, D.Sc., 1. Calcutta, Ph.D., 25; D.Sc., 13. Dacca, Ph.D., 5; D.Sc., 7. Lucknow, Ph.D., 6; D.Sc., 1. Madras, Ph.D., 4; D.Sc., 6. Nagpur, D.Sc., 2. Panjab, D.Sc., 7; D.Litt., 2.

Science News a Century Ago

Brunel's Shields for the Thames Tunnel

THOUGH the shields used to-day for tunnelling through loose ground or water-bearing strata are mainly developed from the shield designed by James Henry Greathead (1844–96) for the construction in 1869 of the Tower Subway beneath the Thames, the original inventor of such a shield was the elder Brunel, who had two built during the construction of the Thames Tunnel begun in 1825 and finished in 1843. The first shield was made by Maudslay, Sons and Field in 1825. It consisted of twelve separate cast-iron frames each divided into three cells in which the miners worked. The frames could be forced forward by screw jacks as the lining of the tunnel with brickwork proceeded. The entire shield weighed 80 tons. Owing to the irruption of the river into the tunnel in 1828, work was suspended for seven years, and the shield remained submerged. On work being resumed in 1835, an improved shield weighing 140 tons was made by Messrs. Rennie, and this was in place by March 1, 1836, when the directors in a report to the proprietors said "that, from the first removal of the old machinery to the erection in its place of the last portion of the new shield, under, at all times, a vertical and lateral pressure of about three thousand tons, and under other circumstances of great difficulty and danger, with which the proprietors are familiar, *not only had no life been lost, but not an accident worth recording had occurred*".

Biot on Tartaric Acid

IN its column of *Miscellanea* of March 5, 1836, the *Athenæum* said: "M. Biot has read a notice to the French Academy of Sciences, on the molecular properties of tartaric acid. The following are the heads of his memoir:—If we dissolve an equal weight of crystallized tartaric acid in different proportions of distilled water, at a temperature of from 22 to 26 centensimal degrees, and make a ray of polarized light, of fixed refrangibility, traverse the solutions, the following phenomena will be manifested. 1st In each solution at different depths, the primitive plane of the polarized ray will be found to deviate to the right, in an angular quantity, proportional to the weight of the acid traversed by the ray. 2nd The absolute extent of this deviation, for the same weight of acid, varies according to the quantity of water in the solution which shows, that in each, the total deviation of the ray is the source of the deviations successively performed by the atomic groups of acid traversed by the ray. 3rd The deviation which the ray undergoes with an equal weight of acid, increases with the quantity of water in nearly an equal proportion; which proves that the power of the molecular rotation of the acid augments with the quantity of water in the solution, and that this water has an influence on the different atomic groups which produce the rotation; consequently it is not a simple mixture, but a true combination."

It was twelve years after Biot's observations that Pasteur, in 1848, made his brilliant discovery of the true nature of tartaric acid (see NATURE of December 23, 1922. Supplement p. viii).

Rapson's Improvements in Steering Gears

THE ease with which large vessels are steered to-day in any weather is due to the successive improvements in steering gears made by a large number of inventors, among whom one of the most notable was John Rapson of Penrhyn. At a time when tillers were controlled by chains or ropes led over a winch barrel attached to the steering wheel, he brought out both the 'double screw' gear and the 'Rapson's slide', which rendered steering easier and a far less dangerous operation in a heavy sea than it had been hitherto. His double screw gear was fully described in the *Mechanics' Magazine* of March 5, 1836. The writer of the article concluded his description by saying: "The only objection to this steering apparatus which at present occurs to us, is that it may cause the rudder to give a too stubborn resistance to the sea, so that a heavy wave would break away the patent steered rudder, while one with the common tiller, rope and drum, would yield a little to the opposing force and we need not mention that the safety of the rudder is of paramount importance to the ship." More than twenty years after Rapson had made his invention, the older methods continued to be used, as many as a hundred men sometimes being needed to steer a big armoured cruiser.