the study of the "mechanics of the heavens" by offering large prizes for scientific and practical means of determining the longitude at sea. The lunar theory, which has occupied the attention of the greatest mathematicians since Newton—of Euler, Clairaut, and Tobias Mayer in the last century; of Burckhardt, Plana, and Hansen, of Delaunay and Adams, in the present century—was an outcome of this. It still engages the attention of scientific minds, involving as it does all the most delicate astronomical calculations, whilst for practical nautical purposes the moon has ceased to be the great timekeeper, and has since 1763 been replaced by the wonderful chronometers of Harrison and his successors. A similar stimulus both to abstract scientific research and to the perfection of the practical instruments of measurement was given in this century by the development of submarine telegraphy: in this case both sides of the problem, the scientific and the practical, were attacked, and carried to a high degree of perfection by one and the same mind[1]—

[1] William Thomson's (Lord Kelvin's) investigations and inventions, which made submarine telegraphy at long distances commercially practicable, refer mainly to the overcoming of the "embarrassment" occasioned by the property (discovered by Werner Siemens, 1849, and investigated by Faraday, 1854) which submerged cables possess of "retaining a quantity of electricity in charge along the whole surface." In 1854 Thomson made a full theoretical examination of this phenomenon, showed how it depended on the length, the electric resistance, and the electrostatic capacity of the line, and gave a mathematical formula, with practical examples of the retardation of the signals and the gradual increase of the strength of the electric current at the receiving end of long submarine cables ("On the Theory of the Electric Telegraph" and other papers, reprinted in the 2nd vol. of 'Math. and Phys. Papers,' 1884). The importance of constructing delicate instruments for registering feeble signals, and of a method for reducing the time of single signals, became evident through these theoretical investigations. The mirror galvanometer was first used in 1858 on the first Atlantic cable, and afterwards on the successful cables of 1865 and 1866. It was followed by the spark-recorder, which led to the syphon-recorder (1867-70), which