this law, and renders theory inapplicable; while experiment, as the author remarks, has not yet supplied the defect.

The author devotes the first part of his paper to a consideration of the experiments made by Bossut and other members of the French Academy in 1776, 1778, and by the London Society for the Improvement of Naval Architecture in 1793 and 1798. Both these sets of experiments he regards as inconclusive, partly from the small size of the floating body and the small velocities used, but chiefly from the inadequacy of the means of measuring the actual resistance, and the sources of error arising from the rigidity of the cords used, the friction of pulleys, and that of the line itself dragged through the water, the moving power being a weight suspended and descending uniformly.

In the experiments which form the object of this paper, all these sources of error (which, in some cases, amounted to three times the resistance to be measured,) were avoided by the simple contrivance of estimating the strain exerted on the boat, at every instant, by a spring weighing machine immediately attached to it, through which the tension of the cord was of course transmitted, and which measured the actual tension exerted in overcoming the resistance of the boat, unmixed with any of the other causes of the destruction of power.

The apparatus employed is illustrated by drawings. The experiments were made in the East India Import Dock, whose size and depth are such as to allow no resistance arising from the sides or bottom of the dock. The boat being drawn at each experiment over $\frac{2}{10}$ths of a mile, the time of passing over $\frac{1}{10}$th was carefully noted, and the tension or resistance read off and registered every two seconds. The velocity was preserved uniform by applying the power of men turning a barrel in measured time by the swing of a pendulum.

Four sets of experiments were made on boats of 18 and 28 feet in length, variously loaded, and on a Thames wherry, with velocities from 2 to $5\frac{1}{2}$ miles per hour; and the conclusion from them all is, that the resistance increases in a higher ratio than as the square of the velocity.

Mr. Walker concludes this paper with a comparison between the effect of moving power applied on a rail-road and on a canal, which from these experiments appears to be reduced to equality at lower velocities than if the resistance to the boat were as the square of the velocity.

*On the Corrections in the Elements of* Delambre's *Solar Tables required by the Observations made at the Royal Observatory, Greenwich. By* George Biddell Airy, *Esq. M.A., Fellow of Trinity College, Cambridge, and Lucasian Professor of Mathematics in the University of Cambridge. Communicated by* John Frederick William Herschel, *Esq. V.P.R.S.* Read December 6, 1827. [*Phil. Trans.* 1828, *p.* 23.]

The author was desired by the Board of Longitude to examine the discordancies between the right ascensions of the sun, as observed at

Greenwich, since the erection of the new transit instrument, and as computed by the solar tables of Delambre, which are used in the computation of the Nautical Almanac; with a view to the discovery of the errors in the elements of those tables. The number of observations from which this comparison was made is 1212, and they extend, with an interruption of only three months, from the end of July 1816 to the end of the year 1826. The result of the comparison at first indicated the necessity of a correction of the epochs of the sun's longitude, and of the longitude of the perigee, and perhaps also of the equation of the centre. But upon pursuing the examination through a series of years, it became manifest that some other source of irregularity existed, and that this could be no other than an erroneous estimate of the masses of some of the planets, especially of Venus and of Mars. A more critical examination showed, that there was also an error in the assigned mass of the moon.

The author proceeds to state the process by which he arrived at the determination of the amount of these several corrections. It was found necessary in these investigations to take into account an error which occurred in the tables with regard to the secular motion. It results from his researches, that the epochs for 1816 and those for 1821 to 25 ought to be increased respectively by $4''{\cdot}734$ and $5''{\cdot}061$; that of the perigee increased by $46''{\cdot}3$, and the greatest equation of the centre diminished by $0''{\cdot}84$. The mass of Venus should be reduced in the proportion nearly of 9 to 8, and that of Mars nearly in the proportion of 22 to 15. On a comparison of these results with those which have been derived from an examination of some of Dr. Maskelyne's observations, as given by Burkhardt in the *Connaissance des Tems* for 1816, they are found on the whole to agree in the most satisfactory manner. The principal discordance occurs in the correction of the place of the perigee; a discordance which the author thinks may arise either from want of correctness in the calculation of the term in the motion of the perigee, depending on the square of the time, or, what is more probable, from some undiscovered inequality in the formula, which is a function of the sun's mean longitude.

*Experiments to determine the Difference in the Length of the Seconds Pendulum in London and in Paris. By Captain* Edward Sabine, *of the Royal Artillery, Secretary of the Royal Society. Communicated by* Thomas Young, *M.D., Foreign Secretary to the Royal Society, and Secretary to the Board of Longitude.* Read November 15, 1827. [*Phil. Trans.* 1828, *p.* 35.]

The author commences this paper by a brief statement of the existing state of the determinations of standards of length in the two countries; and he observes an attempt made by M. Arago in 1817 and 1818, to bring into immediate comparison the standards of the two countries, proved inconclusive from the rates of the pendulums not having been obtained with sufficient exactness.