

of the watch was only one minute five seconds, and the artist received from the nation 5000*l*. At a later period,³ at the age of seventy-five years, after a life devoted to this object, having still further satisfied the commissioners, he received, in 1765, 10,000*l*., at the same time that Euler and the heirs of Mayer received each 3000*l*. for the lunar tables which they had constructed.

The two methods of finding the longitude, by Chronometers and by Lunar Observations, have solved the problem for all practical purposes; but the latter could not have been employed at sea without the aid of that invaluable instrument, the Sextant, in which the distance of two objects is observed, by bringing one to coincide apparently with the reflected image of the other. This instrument was invented by Hadley, in 1731. Though the problem of finding the longitude be, in fact, one of geography rather than astronomy, it is an application of astronomical science which has so materially affected the progress of our knowledge, that it deserves the notice we have bestowed upon it.

3. *Telescopes*.—We have spoken of the application of the telescope to astronomical measurements, but not of the improvement of the telescope itself. If we endeavor to augment the optical power of this instrument, we run, according to the path we take, into various inconveniences;—distortion, confusion, want of light, or colored images. Distortion and confusion are produced, if we increase the magnifying power, retaining the length and the aperture of the object-glass. If we diminish the aperture we suffer from loss of light. What remains then is to increase the focal length. This was done to an extraordinary extent, in telescopes constructed in the beginning of the last century. Huyghens, in his first attempts, made them 22 feet long;⁴ afterwards, Campani, by order of Louis the Fourteenth, made them of 86, 100, and 136 feet. Huyghens, by new exertions, made a telescope 210 feet long. Auzout and Hartsoecker are said to have gone much further, and to have succeeded in making an object-glass of 600 feet focus. But even such telescopes as those of Campani are almost unmanageable: in that of Huyghens, the object-glass was placed on a pole, and the observer was placed at the focus with an eye-glass.

The most serious objection to the increase of the aperture of object-glasses, was the coloration of the image produced, in consequence of the unequal refrangibility of differently colored rays. Newton, who discovered the principle of this defect in lenses, had maintained that

³ Mont. iv. 560.

⁴ Bailly, ii. 253.