

ists we have mentioned, has invented a method of dividing the circle still superior to the former ones; indeed, one which is theoretically perfect, and practically capable of consummate accuracy. In this way, circles have been constructed for Greenwich, Armagh, Cambridge, and many other places; and probably this method, carefully applied, offers to the astronomer as much exactness as his other implements allow him to receive; but the slightest casualty happening to such an instrument, after it has been constructed, or any doubt whether the method of graduation has been rightly applied, makes it unfit for the jealous scrupulosity of modern astronomy.

The English artists sought to attain accurate measurements by continued bisection and other aliquot subdivision of the limb of their circle; but Mayer proposed to obtain this end otherwise, by *repeating* the measure on different parts of the circumference till the error of the division becomes unimportant, instead of attempting to divide an instrument without error. This invention of the Repeating Circle was zealously adopted by the French, and the relative superiority of the rival methods is still a matter of difference of opinion.

[2d Ed.] [In the series of these great astronomical mechanists, we must also reckon George Reichenbach. He was born Aug. 24, 1772, at Durlach; became Lieutenant of Artillery in the Bavarian service in 1794; (Salinenrath) Commissioner of Salt-works in 1811; and in 1820, First Commissioner of Water-works and Roads. He became, with Fraunhofer, the ornament of the mechanical and optical Institute erected in 1805 at Benedictbeuern by Utzschneider; and his astronomical instruments, meridian circles, transit instruments, equatorials, heliometers, make an epoch in Observing Astronomy. His contrivances in the Salt-works at Berchtesgaden and Reichenhall, in the Arms Manufactory at Amberg, and in the works for boring cannon at Vienna, are enduring monuments of his rare mechanical talent. He died May 21, 1826, at Munich.]

2. *Clocks*.—The improvements in the measures of space require corresponding improvements in the measure of time. The beginning of any thing which we can call accuracy, in this subject, was the application of the Pendulum to clocks, by Huyghens, in 1656. That the successive oscillations of a pendulum occupy equal times, had been noticed by Galileo; but in order to take advantage of this property, the pendulum must be connected with machinery by which its motion is kept from languishing, and by which the number of its swings is recorded. By inventing such machinery, Huyghens at once obtained