

servings, by finding that Hevelius refused to adopt them because they would make all the old observations of no value. He had spent a laborious and active life in the exercise of the old methods, and could not bear to think that all the treasures which he had accumulated had lost their worth by the discovery of a new mine of richer ore.

[2d Ed.] [Littrow, in his *Die Wunder des Himmels*, Ed. 2, pp. 684, 685; says that Gascoigne invented and used the telescope with wires in the common focus of the lenses in 1640. He refers to *Phil. Trans.* xxx. 603. Picard reinvented this arrangement in 1667. I have already spoken of Gascoigne as the inventor of the micrometer.

Römer (already mentioned, p. 464) brought into use the Transit Instrument, and the employment of complete Circles, instead of the Quadrants used till then; and by these means gave to practical astronomy a new form, of which the full value was not discovered till long afterwards.

The apparent place of the object in the instrument being so precisely determined by the new methods, the exact Division of the arc into degrees and their subdivisions became a matter of great consequence. A series of artists, principally English, have acquired distinguished places in the lists of scientific fame by their performances in this way; and from that period, particular instruments have possessed historical interest and individual reputation. Graham was one of the first of these artists. He executed a great Mural Arc for Halley at Greenwich; for Bradley he constructed the Sector which detected aberration. He also made the Sector which the French academicians carried to Lapland; and probably the goodness of this instrument, compared with the imperfection of those which were sent to Peru, was one main cause of the great difference of duration in the two series of observations. Bird, somewhat later¹ (about 1750), divided several Quadrants for public observatories. His method of dividing was considered so perfect, that the knowledge of it was purchased by the English government, and published in 1767. Ramsden was equally celebrated. The error of one of his best Quadrants (that at Padua) is said to be never greater than two seconds. But at a later period, Ramsden constructed Mural Circles only, holding this to be a kind of instrument far superior to the quadrant. He made one of five feet diameter, in 1788, for M. Piazzini at Palermo; and one of eight feet for the observatory of Dublin. Troughton, a worthy successor of the art-

¹ Mont. iv. 337.