

but still I find nothing in his second remarkable letter of the 14th of August, 1612, to Marcus Welser, that would indicate his having observed an inequality in the ash-colored margin on both sides of the black nucleus when approaching the sun's edge (Alexander Wilson's accurate observation in 1773). The Canon Tarde in 1620, and Malapertus in 1633, ascribed all obscurations of the sun to small cosmical bodies revolving around it and intercepting its light, and named the Bourbon and Austrian stars\* (*Borbonia et Austriaca Sidera*). Fabricius recognized, like Galileo, that the spots belonged to the sun itself;† he also noticed that the spots he had seen vanish all reappear; and the observation of these phenomena taught him the rotation of the sun, which had already been conjectured by Kepler before the discovery of the solar spots. The most accurate determinations of the period of rotation were, however, made in 1630, by the diligent Scheiner. Since the strongest light ever produced by man, Drummond's incandescent lime-ball, appears inky black when thrown on the sun's disk, we can not wonder that Galileo, who undoubtedly first described the great solar *faculæ*, should have regarded the light of the nucleus of the sun's spots as more intense than that of the full moon, or the atmosphere near the sun's disk.‡ Fanciful conjectures regarding the many envelopes of air, clouds, and light, which surround the black, earth-like nucleus of the sun, may be found in the writings of Cardinal Nicholas of Cusa as early as the middle of the fifteenth century.§

To close our consideration of the cycle of remarkable discoveries, which scarcely comprised two years, and in which the great and undying name of the Florentine shines pre-eminent, it still remains for us to notice the observation of the phases of Venus. In February, 1610, Galileo observed the crescentic form of this planet, and on the 11th of December, 1610, in accordance with a practice already alluded to, he concealed this important discovery in an anagram, of which Kepler makes mention in the preface to his *Dioptrica*. We learn

\* Delambre, *Hist. de l'Astronomie Moderne*, t. i., p. 690.

† The same opinion is expressed in Galileo's Letters to Prince Cesi (May 25, 1612); Venturi, Part i., p. 172.

‡ See some ingenious and interesting considerations on this subject by Arago, in the *Annuaire pour l'an 1842*, p. 481-488. Sir John Herschel, in his *Astronomy*, § 334, speaks of the experiments with Drummond's light projected on the sun's disk.

§ *Giordano Bruno und Nic. von Cusa verglichen*, von J. Clemens, 1847, s. 101. On the phases of Venus, see Galilei, *Opere*, t. ii., p. 53, and Nelli, *Vita*, vol. i., p. 213-215.