one has but to read Webb's delightful pages to form an idea of the countless pleasures he derived from observing with it. Speaking of it, he says that smaller ones will, of course, do less, especially with faint objects, but are often very perfect and distinct, and that even diminutive glasses, if good, will, at least, show something never seen without them. He adds: "I have a little hand-telescope twenty-two and one-quarter inches long, when fully drawn out, with a focus of about fourteen inches, and one and one-third inches aperture; this, with an astronomical eye-piece, will show the *existence* of sun spots, the mountains in the moon, Jupiter's satellites, and Saturn's ring." In another place, speaking of the sun, he says an object-glass of only two inches will exhibit a curdled or marbled appearance over the whole solar disc, caused by the intermixture of spaces of different brightness. In this connection, it is instructive to note that Dawes recommended a small aperture for sun-work, including spectroscopic examination, he, himself, like Miller of Toronto, preferring to use, for that purpose, a four-inch refractor.

The North Star is a most beautiful double. Its companion is of the ninth order of magnitude, that is, three magnitudes less than the smallest star visible to the naked eye on a dark night. There was a time when Polaris, as a double, was regarded as an excellent test for a good three-inch telescope; that is, any three-inch instrument in which the companion could be seen, separated from its primary, was pronounced to be first-class. But so persistently have instruments of small aperture been improved that the Pole Star is no longer an absolute test for three-inch objectives of fine quality, or, indeed, for any first-rate objective exceeding two inches, for which Dawes proposed it as a standard of excellence, he having found that if the eye and telescope be good, the companion may be seen with such an aperture armed with a power of 80. As a matter of fact, Dawes, who was, like Burnham, blessed with most acute vision, saw the companion with an instrument no larger than an ordinary spy-glass, that is, one inch and three-tenths in diameter. Ward saw it with an inch and one-quarter objective, and Dawson with so small an aperture as one inch. T. T. Smith has seen it with a reflector stopped down to one inch and one-quarter, while in the instrument still known as the "great Dorpat reflector," having been regarded as gigantic in proportions when it was manufactured, it has been seen in broad daylight. This historic telescope has a twelve-inch object-glass, but the difficulty of seeing, in sunshine, so minute a star is such that the fact may fairly be mentioned here.

Another interesting feature is this: Celestial objects once discovered, and thought to be visible in large telescopes only, may often be seen in much smaller ones, when the observer knows what he is looking for. The first Herschel said truly that less optical power will show an object than was required for its discovery. The rifts, or canals, in the Great Nebula in Andromeda, form a case in point, but two better illustrations may be taken from the planets. Though Saturn was for many years subjected to most careful scrutiny by skilled astronomers using the most powerful telescopes in existence in their day, the crape-ring eluded discovery until November, 1850, when it was independently seen by Dawes, in England, and Bond, in the United States. Both were capital observers, and employed excellent instruments of large aperture, and it was naturally presumed that only such instruments could show the novel Saturnian feature. Not so. Once brought to the attention of astronomers, Webb saw the new ring with his three and seven-tenths telescope, and Ross saw it with an aperture not exceeding three and three-eighths in diameter, while Elvins, of Toronto, was able to make