Account of some Optical Inventions of
Professor AMICI
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2. The second memoir appears to exhibit a less fortunate attempt to obtain novelty without essential improvement. It relates to "the construction of an **achromatic telescope without lenses, and with a single refractive medium**". "It has hitherto been believed", says the author, "by natural philosophers, that the dispersion of colours is constant for the same refracting medium, or that a given refraction, produced by the same substance, is accompanied by a given dispersion. But I have found that the dispersion produced by more than one refraction is not by any means constant, but varies according to the various inclinations of the incident ray". He finds, however, that this property is really deducible from the constant proportion of the sines, and observes in conclusion, that "although the theory of colours has been cultivated by so many distinguished mathematicians and opticians, from the days of Newton to the present time, the property here described not only remained unknown, but the thing was judged impossible, until I discovered its practicability by means of some experiments which I was making with another view. We may therefore consider this circumstance as a striking proof, among many others, that in the prosecution of physical science, experiment is very often, and perhaps most commonly, more successful than theory, with regard to the development of all the circumstances that accompany a given phenomenon".

Now it is well known, that Euler was aware of the difference of dispersion that might be obtained in this manner from the same refractive substance, and the author himself quotes the work of our countryman, Dr. Brewster, who has entered very fully into the investigation of the subject. "The celebrated Dr. Brewster", he says, "in his excellent Treatise on New Instruments, informs us, page 400, that he has made several attempts to exclude colours by means of an object glass composed of two lenses of the same substance; but his experiments were not crowned with the desired success".

Mr. Amici, however, appears to have been considerably more successful in a practical point of view. He informs us that "ever since the year 1815, he has made telescopes of prisms of larger and smaller angles, which have fully answered his expectations. One of them, less than an inch in length, and half an inch in breadth, composed of little prisms of French glass, with angles of 45°, affords so much distinctness and precision in the outlines of the image, that it exceeds in its effect the most perfect achromatic opera glasses".

The construction of this extraordinary machine he has not more particularly described: he has, however, explained the general principle upon which it depends, and although it may be apprehended that it can never be applied to instruments of material importance, it really appears to have afforded him an elegant little plaything.

"Supposing, that through a prism, having its axis in a vertical direction, we look at a small square object, having one of its sides also vertical, it is obvious, that if we turn the edge of the prism so as to incline it towards the object, the image will become an oblong rectangle, instead of a square. If we then take a second prism of the same substance, and place it behind the former, with its axis horizontal, and turn it until it produces an equal deviation, the image will manifestly be prolonged in a vertical direction, and will again become a square, magnified, but still coloured. Now, since a coloured spectrum of a given extent may be produced in two different ways, that is, either by turning round its axis a prism with a small angle, in order to increase its refractive effect, or by making a prism of the same substance with a larger angle, it will be easy, without recurring to the first method, which would produce a distortion of the image, to determine the angle to be given to a

third prism, in order that its least refraction may produce a spectrum of equal extent to that which is formed by the two combined prisms. If then we place this third prism behind the two former, in such a manner that its refraction may be in the direction of the diagonal of the square, it will correct the dispersion of the colours, without distorting the object, which will of course still remain magnified; so that the system of these three prisms alone will constitute an achromatic telescope consisting of a single refractive substance only".