ART. XXXIV.—*On an Improved Heliostat invented by Alfred M. Mayer; by ALFRED GOLDSBOROUGH MAYER.*

IN 1885 my father, the late Professor A. M. Mayer, invented a heliostat which is superior in many respects to all forms of this instrument at present existing. As far as I am aware, my father never described his invention, and believing that an

account of its construction may be of service to science, I hereby present a description of the instrument.

The common forms of heliostats consist of one or more plane mirrors carried by a driving clock so as to maintain a solar beam continuously in one direction. The plane mirrors have to be of considerable size, and for accurate work are costly, moreover it is a matter of much difficulty to insure a constant direction of the reflected light owing to the complexity of the mechanism of the driving apparatus.

The heliostat here described avoids these difficulties, is of very simple and cheap construction and possesses the unique advantage that it will maintain a parallel, convergent, or divergent solar beam in one direction with perfect steadiness, and will produce a highly illuminated field of uniform intensity with an amount of heat much less than that given by the forms of heliostats hitherto used.

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The essential and characteristic parts of the instrument (fig. 2) consist in a biconvex lens (J) which receives the sun's light and produces a convergent beam that is rendered parallel by the small biconcave lens (K). The beam is then reflected in some desired direction by means of the totally reflecting prism (f). The two lenses, J and K, and the prism, f, are all

arranged upon a common axis, and mounted equatorially in a suitable frame-work adjustable to the sun's declination by means of the graduated arc (S, fig. 1). This frame work is controlled by a driving clock (A, fig. 1) of the type commonly used in other heliostats. The beam of light which is reflected from the prism (*f*) may be thrown in any direction by means of the reflecting prism, L (fig. 2), which is placed somewhere near but forms no essential part of the instrument.

This heliostat is especially well adapted to microscopic and spectroscopic work and to projection with the lantern. By its means a very intense beam of sunlight may be obtained, which is so remarkably free from heat that it may be passed with perfect safety through microscopic slides containing the most delicate objects. In this manner beautifully well-defined images of microscopic objects were thrown upon a screen under a magnification of 3800 diameters.

Harvard University, August 1st, 1897.