

**LENSES AND SYSTEMS OF  
LENSES, TREATED AFTER  
THE MANNER OF GAUSS**

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Lenses and Systems of Lenses, Treated after the Manner of Gauss by Charles Pendlebury

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**CHARLES PENDLEBURY**

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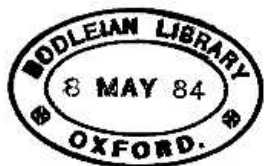
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IN the following pages I have limited myself strictly to the consideration of that which is involved in the term "Lenses and Systems of Lenses"; and I have treated the matter in accordance with the methods of Gauss. But I hope that in course of time I may be able to extend the book so as to cover a wider area in the field of Geometrical Optics.

C. P.

ST. PAUL'S SCHOOL,  
LONDON.  
*February, 1884.*





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# LENSES AND SYSTEMS OF LENSES.

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## CHAPTER I.

### REFRACTION AT A SINGLE SURFACE.

1. IF a ray of light, or a pencil of rays traverse a system of coaxial lenses,—the lenses being of any thickness, of any focal lengths, and of any refractive indices whatever—the relation between the positions of the focus of the incident and the focus of the emergent pencil, and a formula for the *magnification* produced by the system of lenses, could formerly be determined only by an exceedingly cumbrous calculation. It was necessary, moreover, to repeat the process for each different system.

For the sake of simplicity it was often assumed that the lenses were indefinitely thin. The laboriousness of the calculations was thereby considerably reduced; but it is clearly a supposition which it is quite improper to make, except under very special circumstances.

In a paper communicated by Gauss to the Royal Society of Göttingen on the 10th of December, 1840,\* it was shown how the solution of the problem could be made to depend upon the determination, for each system and once for all, of four fixed points situated upon the axis of the system. These points having been determined, the complete solution of the problem became a matter of simple algebra or Geometry.

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\* C. F. Gauss *Werke*. Band. V, Göttingen, 1840.