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A.D. 1814 . . . . . N<sup>o</sup> 3781.

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Optical Instruments,

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HAMILTON'S SPECIFICATION.

**TO ALL TO WHOM THESE PRESENTS SHALL COME,** I, WILLIAM FRANCIS HAMILTON, of Asylum Buildings, Westminster Road, in the Parish of Saint Mary, Lambeth, in the County of Surrey, Engineer, send greeting.

**WHEREAS** His present Majesty King George the Third, in and by His  
5 Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Twelfth day of February last, for Himself, His heirs, and successors, did give and grant unto me, the said William Francis Hamilton, His special licence, full power, sole privilege and authority, that I, the said William Francis Hamilton, my executors, administrators, and assigns, and  
10 every of them, by myself and themselves, or by my and their deputy or deputies, servants or agents, or such others as I, the said William Francis Hamilton, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term of years therein expressed, should and lawfully might make, use, exercise,  
15 and vend, in England and Wales, and the Town of Berwick-upon-Tweed, and also in His Majesty's Colonies and Plantations abroad, my Invention of "**CERTAIN IMPROVEMENTS IN OPTICAL INSTRUMENTS OR APPARATUS,**" in which said Letters Patent there is contained a proviso, obliging me, the said William Francis Hamilton, by an instrument in writing under my hand and seal,  
20 particularly to describe and ascertain the nature of my said Invention, and in what manner the same is to be performed, and to cause the same to be inrolled in His Majesty's High Court of Chancery within two calendar months next and immediately after the date of the said recited Letters Patent, as in and by the same, reference being thereunto had, will more fully appear.

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**NOW KNOW YE**, that in compliance with the said proviso, I, the said William Francis Hamilton, do hereby declare that the nature of my said Invention, and the manner of performing the same, are particularly described and ascertained as follows, that is to say:—

Firstly, in the improvements delineated and set forth in Figure 1, hereunto 5 annexed, the letter *a* denotes an object glass or single lens, having its focus of parallel rays positive, and the letter *b* denotes a meniscus or concavo convex lens, having its focus of parallel rays negative or vortual, and the said lenses are so disposed that they have one common axis, the concave surface of the meniscus being nearest to *a*, and the convex surface of the same being silvered; 10 and I do admit the rays of light from remote objects on the side or region *c* to fall upon and pass the lens *a*, and converge of course towards *b*. And further, I do intercept the said converging rays by the meniscus *b*, which for that purpose I do place at the distance from *a*, by preference, of about one-fifth or sixth part of the focal length of the said lens *a*. And, moreover, I do 15 make the curvatures of the surfaces of the meniscus *a* such as that the aberrations from sphericity, and from the unequal or chromatic refraction of light produced by the lens *a*, shall be corrected or nearly so, as to practise by the contrary refraction effected in passing to the remoter or silvered surface of *b*, and back again towards the common axis from the last-mentioned lens 20 or glass, at or near which axis a correct image will be formed. And I do view the said image by an eye piece of any of the usual constructions, containing a small inclined speculum, or otherwise, by what has been called the direct view, in large reflecting telescopes, wherein the focal image is thrown out of the axis by inclining the reflection, as may be done with 25 the meniscus in my said improvement. And I do further declare, that my said improvement is particularly adapted to astronomical uses, and that the considerable focal length of the lens *a* renders it convenient for bisection as a micrometer. And lastly, as to the said Figure 1, that the lines which are drawn in contact with the capital letter A, would, if continued, form an angle denoting 30 the angle of deflection produced in the incident ray by the refraction of the lens *a*, and that the lines which are drawn in contact with the capital letter B would, if continued, form an angle denoting the angle of deviation produced in the incident ray by the contrary refraction of the meniscus *b*, and that the lines which are drawn in contact with the capital letter C would, if continued, 35 form an angle denoting the angle made by the ray after reflection, and the ray which impinged at the point of reflection. *f, l, f, l*, shews the space over which the false lights are diffused, which from its great extent renders them of no consequence. And I do further declare, that if both lenses be made of glass of a medium or mean refractive power and of the same kind of glass, 40

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(which last, in order to avoid the tertiary chromatic refraction, is desirable,) the single object lens may be made plano-convex, having the convex side outwards, and that whatever may be the radius of curvature of the said convex surface, the concave surface of the meniscus must have its radius equal to  
 5 three-ninth parts of the said first-mentioned radius, and the convex surface of the meniscus must have its radius equal to five-ninth parts of the said first-mentioned radius; or in case the lens *a* be a double convex, the last-mentioned numbers must each be diminished to one half, and that such and the said proportions will in practice afford an improvement, by which the instrument  
 10 will be correct or very nearly so. And farther, that I have not considered it to be needful to explain the general principles of optical theory upon which the improvements herein set forth are founded and established, because the said general principles are well known to opticians, who will easily apply the same unto the said improvements.

15 And, secondly, in the improvement delineated and set forth in Figure 2, hereunto annexed, the letter A denotes an achromatic object glass, to receive parallel rays; and B denotes a second achromatic object glass in a fixed position to receive converging rays; and C denotes an amplifying lens; and D, a concave eye-glass, both which last are so adapted to each other with regard to figure  
 20 and materials, as to correct the aberrations of sphericity and colour in the eye piece; and the letter *a* denotes the focal point of the first object glass A, taken singly, and the letter *b* denotes the focal point of parallel rays, after having passed through the lenses A and B, as combined in the Figure.

In witness whereof, I have hereunto set my hand and seal, the Twelfth  
 25 day of April, in the year of our Lord One thousand eight hundred and fourteen.

WILLIAM FRANCIS HAMILTON. (L.s.)

**AND BE IT REMEMBERED**, that on the same Twelfth day of April, in the year above mentioned, the aforesaid William Francis Hamilton came  
 30 before our Lord the King in His Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute in that case made and provided.

Inrolled the same Twelfth day of April, in the year above written.

SAM. C. COX.

FIG. 1.

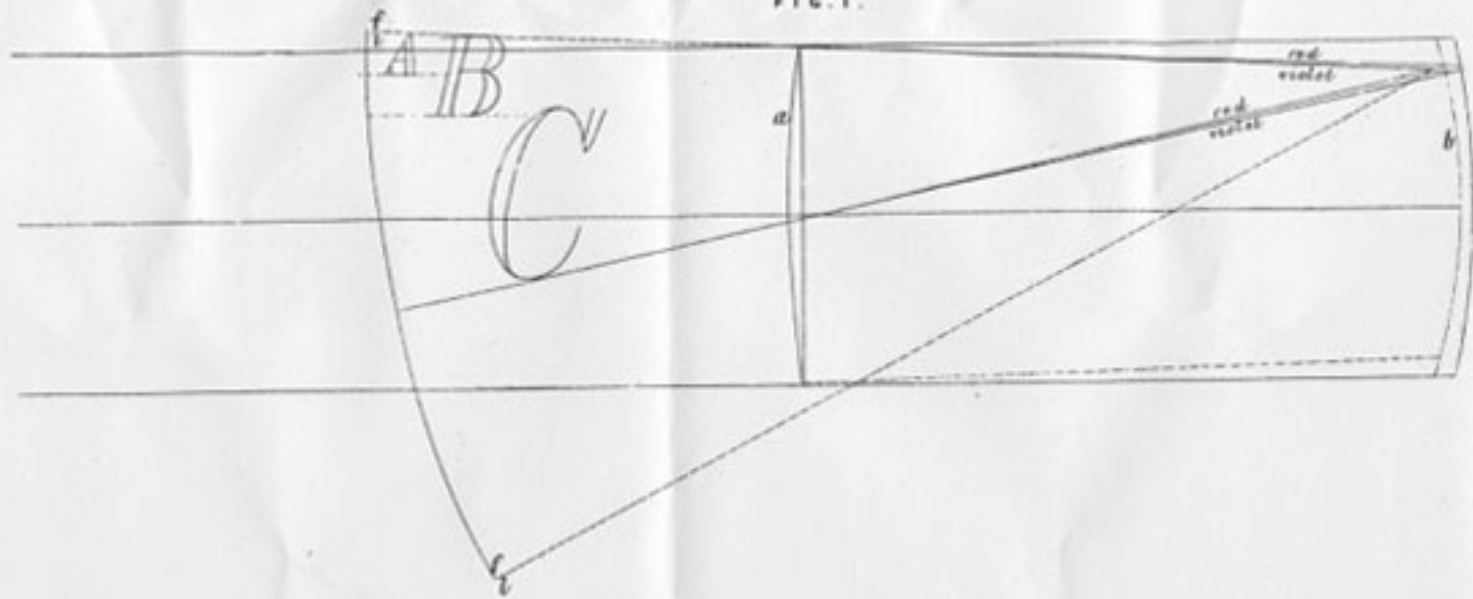


FIG. 2.

