Professor Amici's Improved Camera Lucidas

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In using the ingenious camera lucida, invented by Dr Wollaston, and described in several English works[*], a practical difficulty has been experienced arising from the alternate appearance and disappearance of the point of the pencil by which the outline is traced. In order to understand this, says Professor Amici, let ABCD, Plate I. Fig. 15, be Dr Wollaston's quadrangular prism. The eye at O, perceives by means of two reflections from DC, CA, the object Q, and refers it to P. The pencil held in the hand at P is seen by one-half of the pupil, and the object by the other half, so that, by a slight motion of the eye, the pencil, or the ray, is seen indistinctly, according as the part of the pupil by which they are viewed becomes greater or smaller. In order to avoid this evil, M. Amici adopted the construction in Plate I. Fig. 16, where ABC is a metallic mirror, whose polished surface AB, is inclined 135° to the plain surface BD, of a piece of glass DCFE, with parallel faces. The eye at O, now sees the object R and Q, by the rays RMPO, reflected at M and P. As both the pencil and the rays are seen with the whole pupil, the object may be drawn with the greatest facility. When lenses are used in this construction, a concave one should be placed before the mirror ABC, and when a convex one is used, it should be placed below the glass towards the paper at Q. By these lenses, a copy larger or smaller than the object may be drawn. The camera lucida used by Professor Amici is fitted up as in Fig. 18, which is half its real size. In order to get rid of the reflection from the second surface of the glass, as shown in Fig. 17, by the ray CDFC, which enters the glass, M. Amici removes the polish from the part DM, so that no light is reflected at D[**].

In order to prevent a reverse image of the objects produced by the metallic mirror from being seen, a small plate AB of blackened copper is placed as in Fig. 18, which stops the upper rays which a single reflection would bring to the eye. A rectangular aperture, to which the eye is applied, is made in the copper, the smallest sides of the rectangle being larger than the pupil, and the other sufficient for seeing enough of the objects.

Another construction which M. Amici thinks better than that of Fig. 16, is shown in Fig. 19, where RMNO is the progress of the ray from the object, being reflected at M from the polished surface FG, of the metallic mirror EDFG inclined 45° to BD. In this combination, the second reflection from the glass plate cannot be removed by grinding the face AC, but this image may always be prevented from reaching the pupil, by giving a proper thickness to the glass.

In order to make the two faces of the glass perfectly parallel, in which case distant objects will not appear double, M. Amici constructed a triangular prism of glass, and having cut it in two, he united the part ACD, ADB, Fig 19, so as to form a parallelepiped. By giving one of the prisms a slight motion of rotation, a position was easily found in which the two faces were parallel.

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[*] See the *Edinburgh Encyclopædia*, Art. CAMERA LUCIDA.

[**] We have constructed these with plates of topaz, which often split with surfaces perfectly polished, and always mathematically parallel. An inclined edge, as at DE, Fig. 16, can always be got, and often a rough water-worn edge.

A third species[***] of camera lucida has been formed by Amici, with a small metallic mirror inclined to the great one, at an angle of 45°. The small mirror, which is elliptical, and smaller than the pupil, is supported and insulated by a small steel wire. The pencil is, in that case, seen by the outer ring of the pupil.

A fourth kind of camera lucida is shown in Fig. 20, where ABC is an isosceles right-angled prism of glass, having its face, BC, parallel to the metallic mirror MN, with an aperture in it XY, Fig. 2, less than the pupil RS; the ray from Q, follows the progress of the dotted lines to the eye at P, which sees the pencil through the opening XY, while the object is seen in the circular segments at R and S.

The last and the best construction is shown in Fig. 22, where ABC is an isosceles prism of glass, whose base, AB, forms an angle of 45° with MN. The ray then proceeds in the direction PQSO, to the eye at O. The angle at C should be a little less than a right angle, in order that when the eye advances to B, it may not see objects directly reflected from AB. A plate of copper CN, pierced with a longitudinal aperture, as in Fig. 21, is then placed from C to N. In this construction, and indeed in all, the prism ABC, is greatly superior to a metallic mirror. M. Amici points out the great utility of the camera lucida in lithography, as the drawing from nature may be made at once upon the stone.

[***] In place of a metallic mirror, we have found small and perfect crystals of ruby silver, blende, specular iron, and oxide of tin, much better fitted for this purpose, and much easier obtained. If the crystal used is extremely thin, a variation of the position of the eye enables us to vary the relative illumination of the pencil of the tinge. - ED.