the ordinary height is placed near a window where the light of the sun will fall upon it.

It is well to have the shutters closed, and a beam of solar light admitted of the size of the illuminating tube; but this is not absolutely essential if precautions be taken to prevent diffused light entering the camera, and the ground glass be shaded while examining the image on its surface.

Position of the Instrument.—The camera must be turned at right, angles to the source of light and the tube A, or illuminating tube, turned so that the light will fall full into the tube, and be incident upon the whole of the lens G.

If the camera and tube be now in proper position, a cone of light will issue from the end of the camera tube through the centre of the aperture in the diaphragm, which is the condensed light from the lens G reflected from the plate glass D. This cone forms a focus about ½ inch outside the diaphragm, which can be seen by holding a thin piece of white paper near the diaphragm. If it be a cat, or rabbit, that is to be experimented upon, it is well to have it secured in a box of the right size, with the head projecting through an aperture for the purpose.

In photographing the eye of a cat I found it necessary to put it under the influence of chloroform, but the image of the optic nerve, vessels, &c., upon the ground glass is so very bright and clear that I do not doubt, if the most sensitive process be adopted, the impression could be taken instantaneously, thus rendering anæsthesia unnecessary.

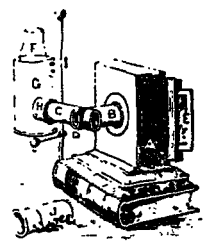
Position of Eye.—In either case the eye must be brought to the proper position, and the eyelids held apart by an assistant. If it be the eye of a patient to be photographed, the instrument must be mounted upon its case, which will, for most persons, give it the right height. The patient being seated upon a chair as close as possible to the table, should lean forward toward the camera, and bring his eye as near as possible to the aperture in the diaphragm, the brow can rest lightly against the end of the tube, and by bringing the elbows upon the table he can, with the palms of his hands, extemporize a very good rest for his chin.

The pupil of the eye to be photographed must have been previously dilated with atropine.

Process.—If the instrument be now in its proper position, and the light from the plate glass enter the dilated pupil, the fundus of the eye will be brilliantly illuminated, and its reflection will pass out of the eye and through the plate glass and lenses, and form an inverted image upon the ground glass at the back of the camera where the observer in the rear will see the optic nerve entrance, distribution of the arteries and veins, &c., beautifully depicted, but magnified about 4 diameters.

If the details of the image be not perfectly defined the camera tube must be moved backwards or forwards until the proper focus be obtained. This image can be seen by the observer again very much magnified by placing to his eye a lens of say six inch focal length, and bringing his eye with the lens to within six inches of the ground glass; but the image will be seen even better by moving the ground glass to one side: the observer will then see the *aerial* image of the reflection from the eye, which will occupy the same position as the ground glass previously occupied. The slide containing the ground glass can now be removed and a slide substituted containing a glass plate "prepared" by the ordinary collodion process. An "exposure" of about five seconds is sufficient. If the "developing" prove that a good "negative" has been obtained, it must be "fixed" and used for printing the photographs; if not, other plates should be employed until a more satisfactory result be obtained.

As an Ophthalmoscope.



The position of the instrument when the light is supplied by a lamp.—A the camera, B camera tube, C illuminating tube, D diaphragm with central aperture, E slide with ground glass, F glass chimney of lamp, G brass tube which acts as a shade and from which projects H, a brass collar opposite the flame of the lamp, and to which is adapted the illuminating tube C of the instrument; I upright of the lamp-stand, J eye-piece to be adapted to the inner extremity of the camera tube B: when this is used, the camera can be dispensed with.

In using this instrument as an ophthalmoscope, that is, for examining the interior of the eye, artificial light should be employed. That from a kerosene oil lamp answers very well, but the best light for ophthalmoscopic purposes is from the gas argand-burner, and the most convenient is the movable table lamp supplied with gas through a flexible tube. The evening is the best time for making these examinations: if in the day time, the room must be darkened, and the instrument be placed in the same position in regard to the light as when solar light is used, but the flame of the lamp should be brought within two or three inches of the entrance of the illuminating tube, and the two must be on the same horizontal line. A screen, to shade the ground glass and the observer's eye, should be placed between the light and the back of the camera, or, what I have found to be much better, a metallic shade can be placed around the lamp, from an aperture in which, projects a tube or collar, somewhat resembling that of a magic lantern, of the right size to allow the illuminating tube of the instrument to fit closely. Indeed with this apparatus the camera can be dispensed with altogether, there is in making examinations of the eye simply when the object is to demonstrate the fundus of the eye to a number of persons, the camera should be used both with and without the ground glass.

Optics.

In the accompanying diagrams I have made the mean position of the optical centre of the eye at the centre of curvature of the cornea, or at a distance one-third of the diameter from the cornea, making the posterior focal distance of the eye about ¾ of an inch. I have also represented the eyes as "homo-" genous bodies, possessed of a single condensing "refracting surface, which is regarded as the opti-" cal equivalent of the various surfaces in a real "eye.

"By giving such hypothetical eyes a higher index "of refraction than that of the media of any real "eye, we may preserve the proportion between the "distance of the cornea and the retina from the "optical centre almost unchanged, while substitut-"ing an equivalent for a real eye, which may be "assumed to be quite accurate in so far as concerns "any optical conclusions with which we have to "do." (*Dr. George Rainy on the Theory of the Opthalmoscope.*)

Illumination.—Let M Q (fig. 1) represent parallel rays of solar light incident upon the double convex