THE L—W (LAURANCE—WOOD)

Orthops Ophthalmoscope

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Reflecting and Refracting Ophthalmoscopes.

Those who use the ordinary refracting ophthalmoscope are aware of the difficulties that arise when an attempt is made to secure a clear view of the fundus.

With the direct method it is essential that the observer's accommodation should be fully under control, a faculty which many people fail to acquire even after long practice, and in addition corneal reflections of the source are very annoying. The greatest difficulty, however, is to get sufficiently close to the observed eye to secure even a moderate field of view through the ordinary undilated pupil, and that which is disclosed is often unevenly illuminated, or the operator does not direct the illuminating beam in the right direction.

With the indirect method a certain amount of accommodative control must also be exercised to pick up the aerial image formed by the condenser. To the annoyance of corneal reflections are added those from the two surfaces of the lens, which must be tilted or otherwise manipulated to remove them from the field of view. The magnification is small—about 5 diameters—and considerable dexterity is necessary to retain the fundus image through the average undilated pupil. Spherical aberration of the condenser also renders the optical dilatation of the pupil irregular and uncertain.

The L—W Ophthalmoscope.

With this instrument practically all of the foregoing difficulties are eliminated. It is entirely reflecting and no lenses at all being employed in the production of the fundus image, there cannot be any reflections from the optical elements of the ophthalmoscope.

The special position of the source, relative to the line of view and the axis of the mirror system, also eliminates corneal reflections when the clear fundus image is obtained. The principle of reflection in place of refraction being employed, the curvature of the condensing mirror is only about one quarter that of the corresponding lens condenser used in ordinary ophthalmoscopy, so that spherical aberration is very small, and optical dilatation of the pupil easily obtained.

The magnification is high—about 10 diameters—and a field of view of some 4 discs width is visible for any one position of the instrument.

All the optical parts are fixed so that manipulation is confined simply to holding the ophthalmoscope in the correct position before the observed eye. Strain on the observer's accommodation is relieved by the provision of a low power eye lens, which can be altered in power if necessary, or removed altogether to suit the individual requirements of the user of the instrument.

Description of the Instrument.

Fig. 1. represents a diagrammatic section showing the details of the construction.

E is the removable cup holding in position the eye-lens.

D, the illuminating source, is a small lamp of special construction, having a straight filament lighted

from a small standard large capacity dry battery with which it is connected by a flex.

B is a small spring push contact which must be kept depressed by the thumb when the instrument is in use, the circuit being automatically opened when the pressure is released. This prevents accidental exhaustion of the battery, and prolongs the life of the lamp.

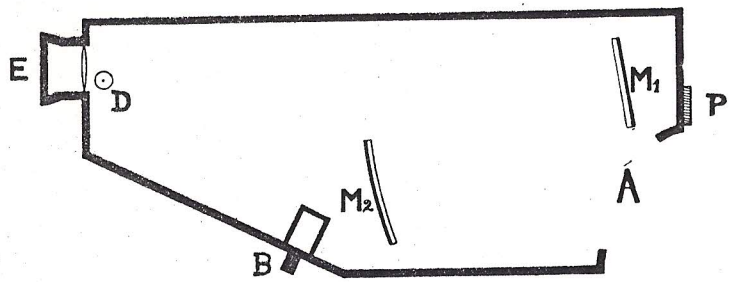


Fig. 1.

The plain and curved mirrors M_1 and M_2 respectively are fixed. Dust, etc., can be easily removed through the aperture A by means of a soft linen handkerchief or camel-hair brush.

When not in use the spring flap should be closed so as to keep the interior clean. The small ebonite plate P forms a brow rest.

When the aperture has been opened by fixing back the hinged flap, and the battery connected up, a real image of the filament in the form of a small horizontal line of light is formed about half an inch or so beyond the brow rest. It can be projected on to a piece of paper, as indicated by L in Fig. 2, and should be sought before attempting to use the instrument.

Fig. 2 shows the course of the light from the source, D, to its real image L.

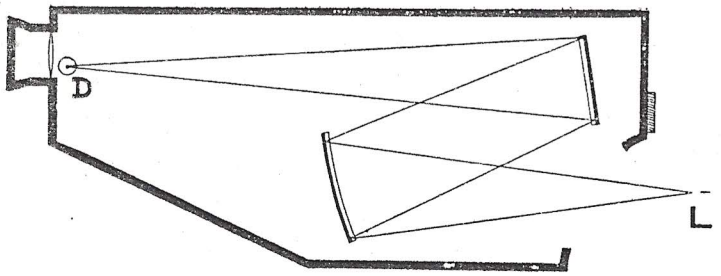
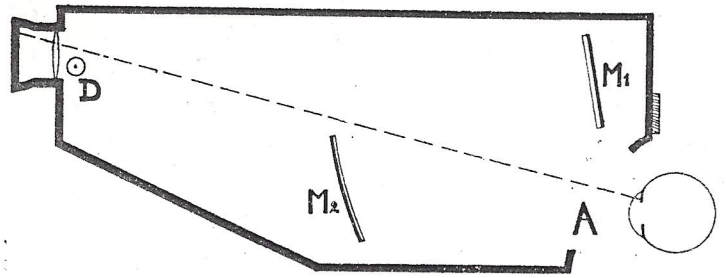


Fig. 2.

The dotted line in Fig. 3. represents the observer's line of vision, which passes above the curved mirror M_2 and below the plane mirror M_1 thus permitting an uninterrupted view out into space through the upper portion of the aperture A.



Fig, 3.

When the instrument is placed before the observed eye, the pupil, iris and part of the sclerotic are seen in a similar manner. The bright line image is then projected on to the pupil, as described later, *and the observer on looking upwards into the plane mirror M_1 will see the fundus image.*

Both observer and subject should stand or sit so that their eyes are approximately in the same horizontal plane.

The use of the Instrument.

Suppose the right eye to be examined. The subject's left eye must be directed to some fixation point on the wall, *e.g.* a small picture, lamp etc.—also at about the level of his eye—so as to prevent movement. The observer then rests the ophthalmoscope lightly against the right brow, and by looking *through* the instrument in the direction shown in Fig. 3 brings into view the subject's cornea.

The ophthalmoscope is then adjusted to and fro until the bright line image L is sharply focussed on the observed eye; it is then projected *on to the upper third of the pupil* as illustrated in Fig. 4. (*a*) which represents the view obtained by the observer. Then, on looking upward into

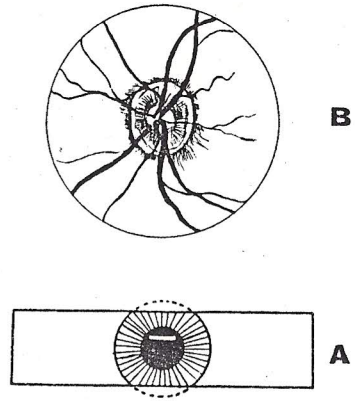


Fig. 4.

the plane mirror M_1 immediately above, the fundus image should be clearly seen as shown in Fig. 4. (*b*).

To bring the optic disc into view, the axis of the instrument should be *slightly inclined outward* from the

subject's line of vision, but once the image has been obtained a little practice will enable the observer to control the ophthalmoscope so as to disclose any portion of the fundus he may wish to explore.

The accompanying photographs show clearly the correct way of holding the ophthalmoscope, *and they should be carefully studied.*

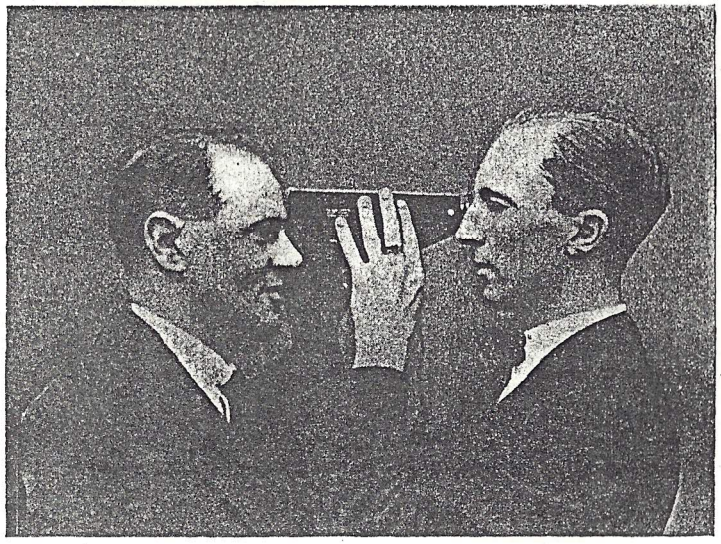


Fig. 5.

In particular it should be noted that the hand (the thumb of which is operating the press button) should lie flat against the side of the instrument so as not to obscure the fixation object from the eye not being examined; otherwise the subject's gaze may wander. The first two fingers and thumb of the other hand grasp the body of the instrument, and the remaining figures rest against the subject's brow, so as to aid movement of the instrument and keep it steady when the view of the fundus is obtained.

Fig. 5 shows the examination of the left eye, and Fig. 6 of the right.

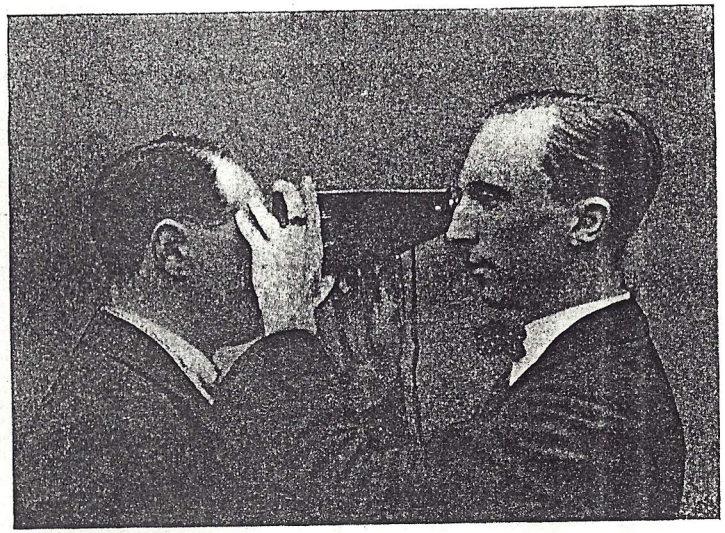


Fig. 6.

Summary of Steps to be followed in viewing the fundus.

(1) The subject is told to gaze at a suitable object on a level with his eye, the observer also being at the same level.

(2) The subject fixes with his left eye when the right is under examination and vice-versa. The instrument is placed in position resting on the subject's brow, as shown in the above photographs, and adjusted as to height. The light is turned on by pressure on the button and the front of the observed eye is seen *through* the ophthalmoscope as shown in Fig. 3.

(3) The small horizontal line image is located somewhere on the cornea or sclerotic—for preference the latter as it is more easily seen. It is focussed sharply by a slight backward or forward movement and then moved *so as to cut the upper third of the cornea as shown in Fig. 4. (a).*

(4) Then on looking *upward* into the mirror M_1 the fundus image is seen as in Fig. 4. (*b*).

Points to be observed.

If the subject's brows be unduly prominent, difficulty may be experienced in placing the opththalmoscope sufficiently close to the observed eye to secure a sharp focus of the source on the pupil. This can be avoided by telling the subject, *while still gazing at the fixation object,* to turn the head half left if the right eye is under examination, or half right if the left eye is being viewed. This enables the instrument to be held at the temporal, and therefore less prominent part, of the brow.

If ametropic the observer should wear his correction. Should he not succeed after attempts on more than one case to secure a perfectly clear image of the fundus, the eye lens can be removed, and if necessary the makers will supply another of different power. The eye-cup can be pulled out by releasing the small clamping screw at the side.

The optic disc, being the most prominent detail of the fundus, should first be sought, and, by a small *angular* movement of the ophthalmoscope to the right or left, or up or down, using the brow rest as a pivot, brought to the centre of the field. A little practice will then enable exploration of the periphery to be made.

Should the image disappear, or be incomplete, it shows that the streak image has been allowed to wander from its correct position on the upper part of the pupil. This must be rectified by the observer looking *through* the instrument so that the streak can again be directed properly on to the cornea. *This is a most important precaution,* and should be closely attended to.

Although the instrument can be used in day- or artificial light the results are better in a darkened room. In any case, however, the subject should not face a bright light.

The Battery.

This is a standard "Ever-ready" No. 295, with a large capacity, and lasts a considerable time with the intermittant use afforded by the push contact already mentioned. No difficulty should be experienced in obtaining a new battery locally from any electrician or dealer in flash lamps, and if not actually in stock, can be obtained to order in a day or two.

The battery holder is of simple design and needs no special description.

Every instrument is sent out in exact adjustment, and therefore users are warned not to interfere with any parts except when it is necessary to change the lamp or eye-lens, *and on no account should the instrument be taken to pieces.*

To change the lamp.

On the left hand side of the instrument near the eye-piece will be found a small hole opposite one end of the lamp. If a match or piece of pegwood be inserted, a gentle pressure

will push out the lamp, which is held in place by two light spring contacts. It is similarly replaced by a gentle push through the large hole on the right hand side. The lamp is obscured with the exception of a narrow rectangular space, and in inserting a new lamp, *great care must be taken that this clear space be turned exactly towards the top mirror, M*1.

Manufactured by

GEORGE CULVER, Ltd.,

London, N.1.

Price, complete with Battery ~~and spare Lamp,~~

£6 10s. 0d.