Miniature binocular indirect ophthalmoscope

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The optical principles of indirect ophthalmoscopy were mastered by Gullstrand (1911) although his ophthalmoscope did not achieve wide popularity because of its complexity and limited field of view.

Schepens (1947) demonstrated his binocular indirect ophthalmoscope 21 years ago in the United States of America.

The instrument described here is a further stage in simplification (Figs 1 and 2). Our intentions in developing it were to reduce the overall weight and to miniaturize the light source without impairing the optical capabilities.

The ophthalmoscope is mounted on spectacle lenses in a shell frame. Each instrument is lighter than conventional ophthalmoscopes; it has no moving parts, and it may be powered from either the mains supply or a battery pack.

The normal range of interpupillary distances is effectively served by two sizes of instrument.

Description

The optical system (Fig. 3, opposite) is mounted on the front surfaces of a pair of spectacle lenses by short connecting tubes cemented into partial trephines.
The key problem in development proved to be the illuminating system. One of us (J.M.P.) proposed a solution utilizing a commercially available electric bulb and a single aspherical condensing lens.

This lens replaces the multiple component condensers of other modern ophthalmoscopes.
Light output is substantially improved by a high reflectance spherical mirror behind the globe. A pre-focused metal attachment to the globe permits rapid replacement of the lamp (Fig. 4).

**FIG. 4** Illuminating system

(1) 6V/1A Miniature lamp
(2) Compensated aspherical condenser
(3) Infrared filter
(4) Surface coated spherical mirror
(5) Pre-focusing holder

A power unit and battery pack have been developed by J.M.P. for use in conjunction with the miniature indirect ophthalmoscope (Figs 5, 6, 7).

**FIG. 5** Power supply – mains unit

S1 – Power switch
S2 – Voltage selector switch
S3 – Intensity selector: cautery
S4 – Intensity selector: any 6V or 12V instrument
L1 – Power and cautery continuity indicator
L2 – Charging indicator

P1 – 2.8V/1A suitable for retinoscope, etc.
P2 – 8V/400 mA battery charger
P3 – 3.5V/3A cautery (intermittent only), etc.
P4 – 6.3V/1A indirect ophthalmoscope, etc.
P5 – 12.6V/1A pantoscope, etc.

**FIG. 6** Portable unit

B (1–5) 1.25V/4Ah, NiCd battery
S1 – Intensity selector
P1 – 6.5V/1A indirect operating magnifying glasses
Developmental work was done by D. Schultz of Scientific Optical Laboratories of Australia with the assistance of the computer unit at the Weapons Research Establishment, South Australia. The miniature binocular indirect ophthalmoscope is manufactured by Scientific Optical Laboratories of Australia Pty. Ltd., 649 South Road, Black Forest, South Australia.

References

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doi: 10.1136/bjo.53.5.356

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