EAR PHOTOGRAPHY

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GOOD quality, easily taken photographs of pathological conditions of the tympanic membrane or middle-ear structures are required for teaching and for recording purposes. Unfortunately, ear photography poses difficult problems which have to be overcome before such pictures can be obtained.

Anatomically the tympanic membrane is conical with the concavity directed outwards. It also lies obliquely. This means that it is difficult to get the whole drum into focus where the depth of field of the camera is limited.

To some extent, this can be overcome by using a small aperture lens, but this in turn means that brighter illumination of the drum must be obtained.

In order to get a picture of the whole tympanic membrane in one view, the lens must be mounted as close to the drum as possible. This is made necessary by the constriction of the meatus about its mid point. Ideally, the lens would be placed close to this constricted area and this can to some extent be achieved by mounting a small lens inside an aural speculum. The area of drum that can be photographed in this way may still be limited by variation in the individual anatomy.

Placing the lens so far into the speculum increases the problem of illumination of the tympanic membrane, as the light source has to be brought farther into the ear than the lens.

To overcome this problem of illumination, a "Perspex" speculum was made 73 mm. diameter at its base tapering to 6 mm. diameter at the tip. The wall thickness of the speculum reduced from 7 mm. at the base to 1 mm. at the tip.

A circular electronic flash tube (type FA 15 70 mm. diameter) was attached to the base of the "Perspex" speculum. The inner and outer surfaces of the speculum were chemically silvered to give an internal reflecting surface and then coated mat black to prevent escape of light to the interior.

An f3·5 lens with a focal length of 35 mm. was mounted within the speculum. This arrangement allows the electronic flash to be carried within the walls of the speculum to its tip without interfering with the

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optical system of the camera. The final light source is a ring of light at the tip of the speculum.

The speculum, flash unit and lens were mounted by an adjustable focusing tube to a 35 mm. "Exakta" reflex camera, which allows direct viewing and focusing through a pentaprism viewfinder.

While this arrangement of illumination is satisfactory for taking the picture, continuous illumination is necessary for focusing. This was provided by a laryngoscope bulb mounted obliquely inside the speculum, distal to the lens, but with a shield behind it to prevent the light from shining on to the lens.

With the lens at full aperture, focusing can be carried out with good

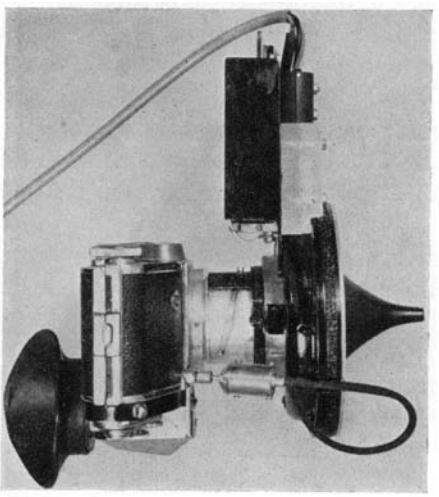


FIG. 1.

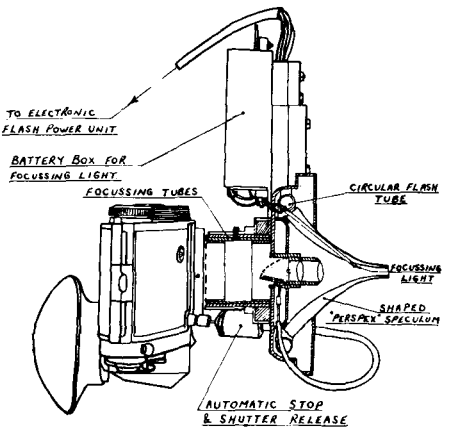


FIG. 2.

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illumination, and, because the wide aperture reduces the depth of field, accurate focusing is facilitated.

For taking the photograph, however, a smaller aperture is required to increase the depth of field. This is provided by an automatic lens stop with an aperture of f19 which is introduced when the cable release operating the shutter and electronic flash is pressed.

The camera and its construction are illustrated in Figs. 1 and 2.

The pictures are simply taken, but it is essential that all wax or debris are removed from the meatus before photography is attempted, as any object close to the end of the speculum is brilliantly illuminated compared with the more distant drum and some fogging of the film may result. Similarly a narrow meatus, which bulges over the end of the speculum, produces the same effect.

Provided these precautions are taken, this camera has proved satisfactory in taking both colour and black-and-white pictures of the tympanic membrane and middle-ear structures. Fig. 3 shows an anterior perforation of the tympanic membrane. Above it is seen a chalk patch, slightly out of focus because of its distance from the camera.

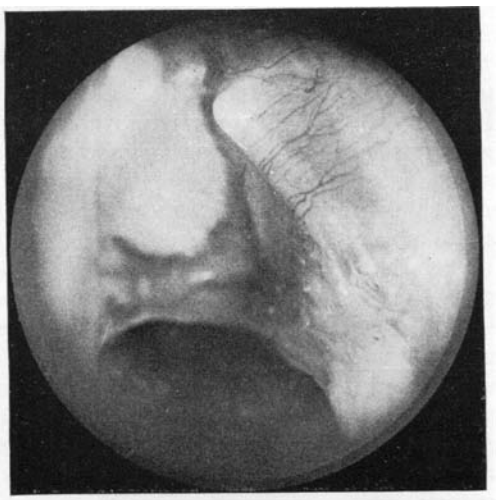


FIG. 3.

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