III.—*An Instrument for excluding Extraneous Rays, in measuring Apertures of Microscope Object-glasses.*

By F. H. WENHAM, Vice-President R.M.S.

(Read before the ROYAL MICROSCOPICAL SOCIETY, April 1, 1874.)

THE angle of aperture of an object-glass is taken from the focal point through which the rays must pass for all degrees. Those entering at other angles within the plane of focus will give a false indication, from diffused light forming no image.

If a conical nozzle, having a small aperture in its apex, is placed over the front of an object-glass, the height of the cone being equal to the focal length, all such false light will be excluded, and image-forming rays only will enter at angles of any extent.

As there would be a difficulty in adapting such cones to every object-glass to be measured, an instrument has been contrived to *meet the requirements*. The traverse is horizontal during the measurement; therefore a vertical slit will serve instead of a circular stop. For high powers it is requisite that the metal edges of this slit should be exceedingly thin, and consequently must be secured from damage from contact with the object-glass or otherwise. The outer sides are required to be exactly in the focal plane during the measurement.

The cuts, full size in plan and side views, illustrate the arrangement. *a a* is a plate of brass with a central square opening chamfered away beneath so as to clear 170° ; *b* is a slip of glass

sliding under two staples *c c*. At *d* is a spring for forcing the glass against the set-screw *e*. On the top surface of the glass there is a strip of platinum foil, $\cdot 001$ thick, cemented on with Canada balsam. Fixed underneath the opposing staple there is a similar piece of foil. By turning up the set-screw to a stop the straight edges of the foils are brought in contact, and opened by reversing the screw.

This instrument is placed on the stage of a microscope, with the body horizontal and set on a wooden turn-table about ten inches in diameter, having its edge divided into degrees. The object-glass to be measured is focussed on the glass surface, and the slit adjusted so that its two edges just appear in the field of view, and by the rotation of the turn-table the degrees of aperture are read off. If the microscope has a thick stage this may cut off the rays for large angles. In this case a cell like an inverted live-box may be made to pass through to the under-side, to which the adjustable slit is fixed, and if the object-glass will not reach it must be extended by an adapter.