THE HILGER WAVELENGTH SPECTROMETER WITH HIGH RESOLVING POWER ACCESSORIES

ADAM HILGER LTD.

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February 1919

These prices are now increased by ~~10~~ 20 per cent.

ADAM HILGER, Ltd.

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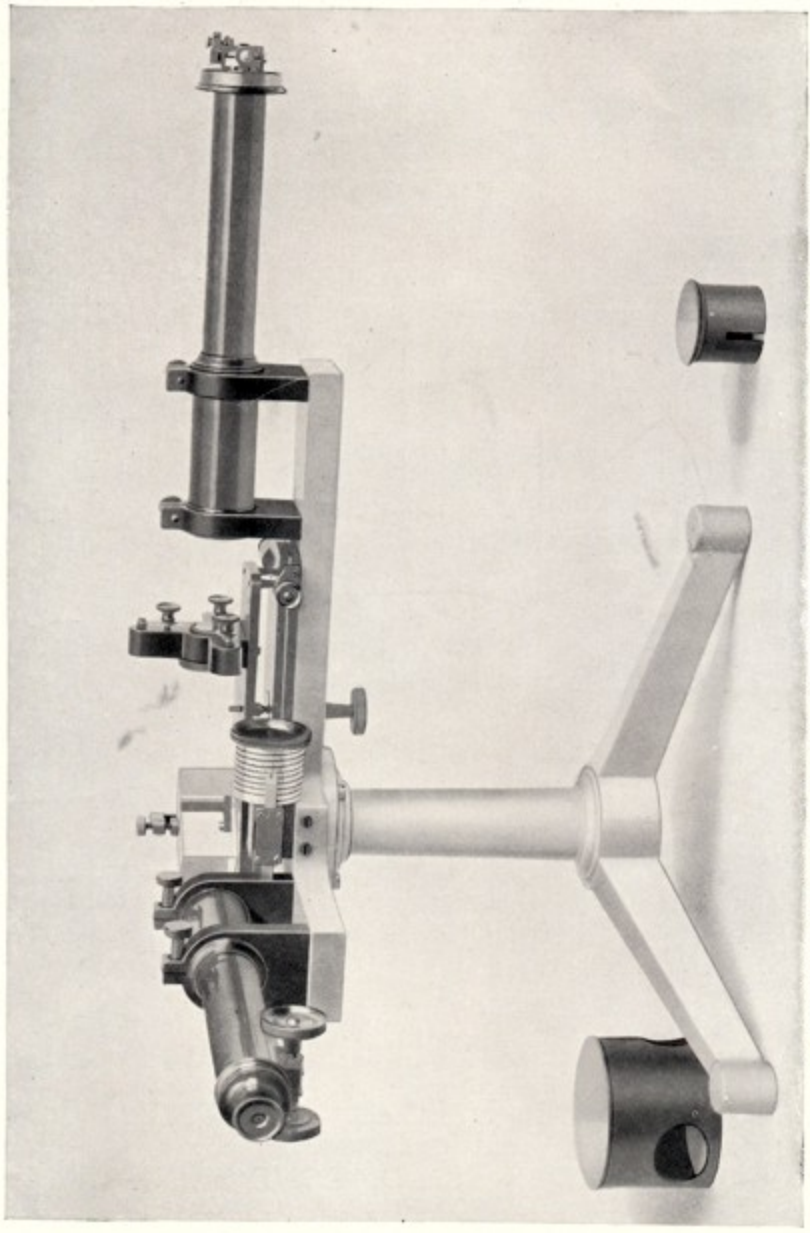

MODIFIED HILGER WAVELENGTH SPECTROMETER WITH ETALON.

THE HILGER WAVELENGTH SPECTROMETER

WITH HIGH RESOLVING POWER ACCESSORIES

THE instruments described in this booklet are :

(a) A Lummer-Gehrcke Parallel Plate

(b) A Fabry & Perot Etalon

(c) A Michelson Echelon Diffraction Grating

They are designed to be suitable for use on the modified form of Hilger Wavelength Spectrometer (Constant Deviation Type), also described below. Thus applied, the Fabry & Perot Etalon affords a means of determining wavelengths to a very high accuracy; while either the Echelon or the Lummer-Gehrcke Plate will demonstrate the Zeeman effect, the effect of pressure on the lines of the spectrum, or the minute structure of any desired lines, with a minimum of trouble and with the great intensity of light which distinguishes these powerful devices for high resolving power. At the same time the wavelengths of the lines under observation can be read off direct from the drum of the Wavelength

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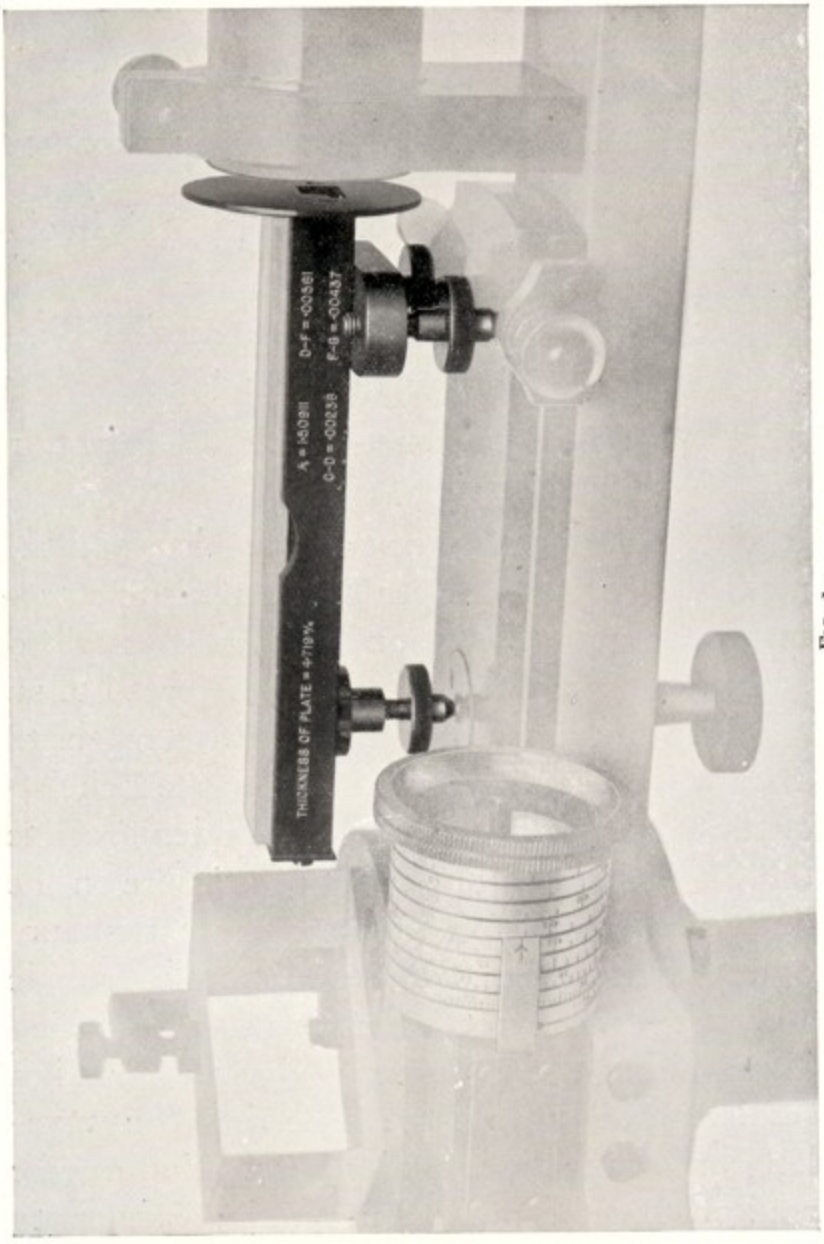

FIG. 1.

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Spectroscope (*see* description of the Hilger Wavelength Spectrometer, Constant Deviation Type).

The mode of application to the Wavelength Spectrometer has the further great advantage that a large number of the lines of the spectrum can be examined at one and the same time, all the lines which are visible in the eyepiece being simultaneously subjected to the analysis of the Lummer Plate, of the Fabry & Perot Etalon, or of the Echelon, as the case may be.

(*a*) **Lummer-Gehrcke Plate,** shown in position on the Wavelength Spectrometer in Fig. 1, in mount complete, suitable for use on the modified form of Spectrometer described below.

Length of plate . . . 130 mm.
Width of plate . . . 15 mm.
Thickness of plate . . $4\frac{1}{2}$ mm.
Length overall of mount, 135 mm.
Resolving power, about 200,000.

PRICE, in mount complete . . £23 0 0

The thickness of the plate and optical properties of the glass of which it is made are engraved on the mount.

(For the theory of the Lummer-Gehrcke parallel plate, see "Annalen der Physik," Band 10, 1903, *p.* 457.*)*

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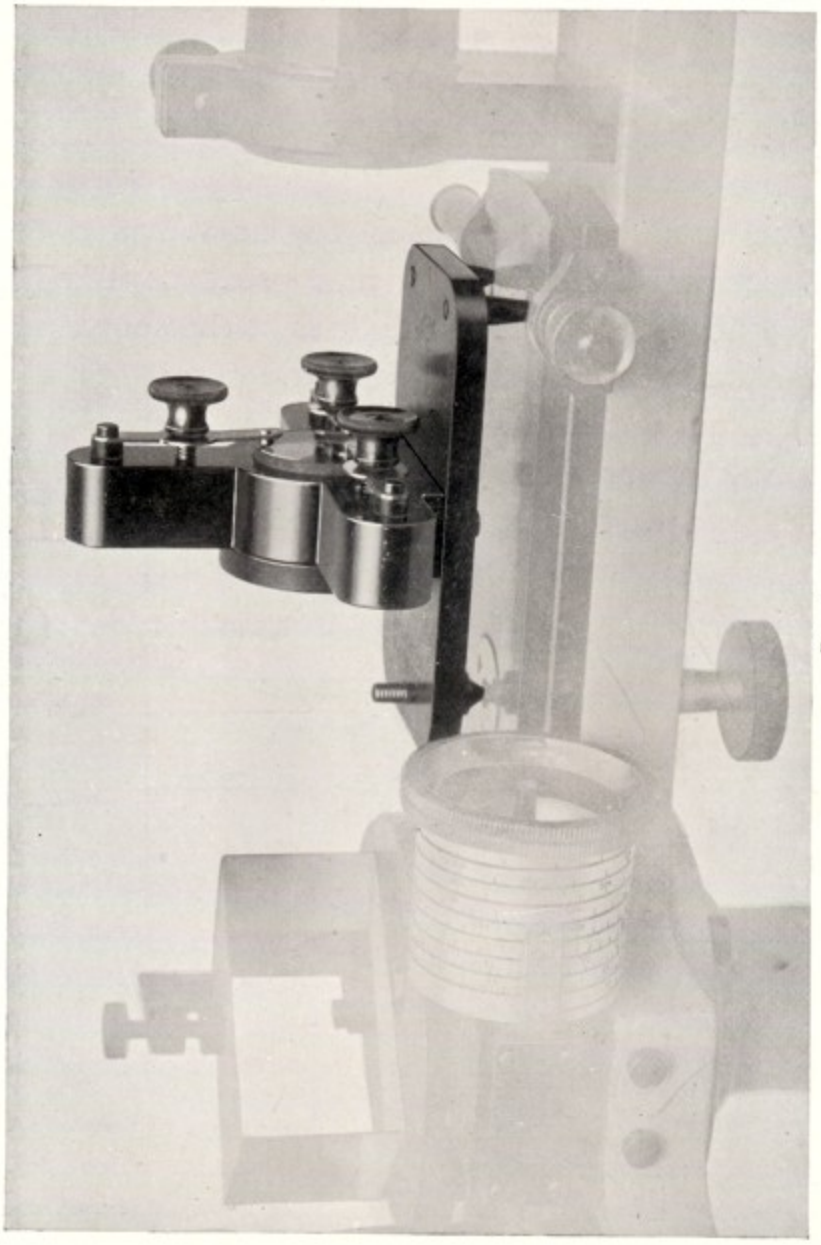

FIG. 2.

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(*b*) **Fabry & Perot Etalon,** shown in position on the spectrometer in Fig. 2. The Etalon is constructed with a distance piece consisting of a hollow cylinder of fused silica between the plates (as described by H. C. Rentschler, *Astrophysical Journal*, December, 1908).

The coefficient of expansion of fused silica being less than that of any other known material (0·000,000,59 per 1° C.—about one-seventeenth that of platinum) temperature alterations can be avoided.

The plates are silvered by cathodic deposition. With silver films deposited in this manner the loss of light is less than by any other known method, except Wood's wet process, which we have also used and which at its best is as good. The necessary condition for sharply defined and bright intensity maxima is thus fulfilled. The plates are made slightly wedge-shaped, to avoid the secondary interference systems caused by reflection at the unsilvered outer surfaces; but the angles of the wedges are the same in each plate, and they are so mounted that the total deviation caused by the Etalon is zero.

The appearance seen in the eyepiece when the

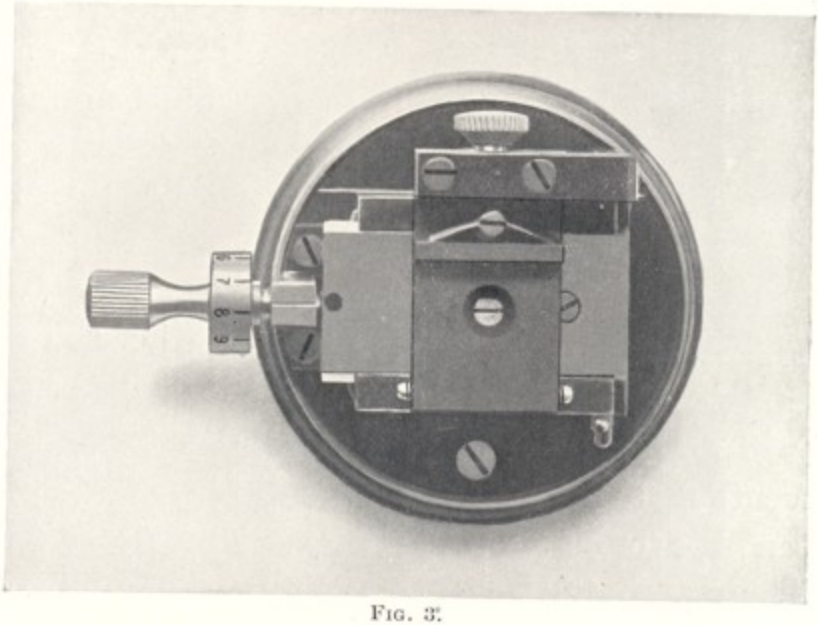

FIG. 3.

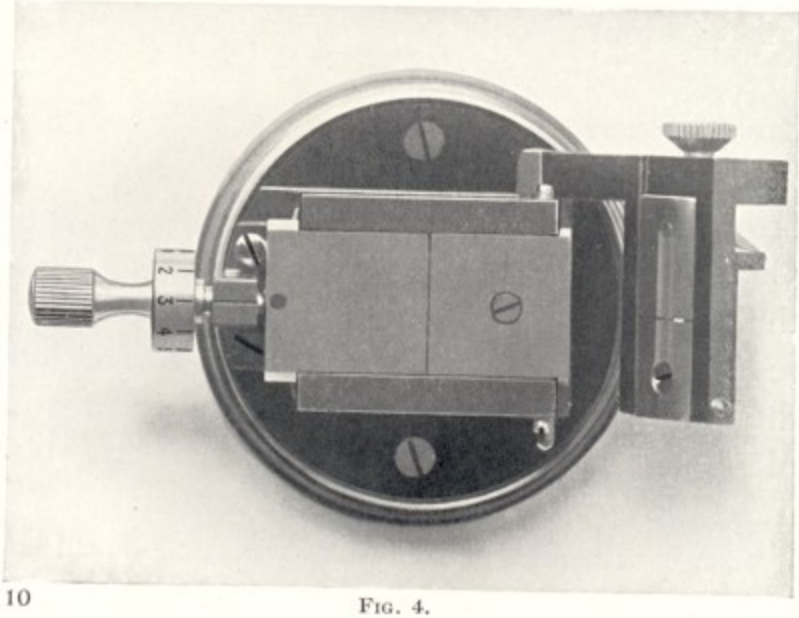

FIG. 4.

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Etalon is in position and correctly adjusted is as follows :—

(*a*) The lines of the spectrum are visible in the same positions as they would occupy were the Etalon removed ; but, of course, less bright.

(*b*) Each spectrum line is a diametral strip of the ring system which would be produced by the Etalon if the field of view were filled with light of the wavelength of the line in question. The diameter of the ring system for each line can be measured with a micrometer eyepiece.

The distance between the plates is about 10 mm., this distance producing a convenient ring system for measurement.

The thickness of the Etalon correct to 0.005 mm. is in each case engraved on the mount.

Length overall of Etalon and mount, 105 mm.

PRICE, complete, with mount . . £21 0 0

For the method of working to obtain standard wavelengths by comparison with lines of accurately known wavelengths, see papers by Lord Rayleigh. Phil. Mag. [6], *May*, 1906, *p.* 685 ; *and* [15], *April*, 1908, *p.* 548.

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(*c*) **Echelon** of highest quality, in mount complete. Suitable for use on the modified form of wavelength spectrometer described below.

(This Echelon requires the extra extension of the base, mentioned on p. 14.)

Number of plates	12
Thickness of plates	10 mm.
Width of step	1 mm.
Effective aperture	29 mm. × 13 mm.
Resolving power, 100,000, for W.L. 5461	

PRICE, in mount complete . . £33 0 0

The accurate thickness of the plates and the optical properties of the glass are in every case engraved on the mount.

NOTE.—*The height to the centre of the aperture in each of the above accessories is* 35 *mm.*

THE HILGER WAVELENGTH SPECTROMETER (CONSTANT DEVIATION TYPE) MODIFIED FOR USE WITH THE ABOVE ACCESSORIES

(*See* Frontispiece, in which the Fabry & Perot Etalon is shown mounted in position.)

(*See also description of the ordinary form in separate booklet.*)

The modifications are as follow :

(1) The arm carrying the collimator is extended to make room for any one of the above acces-

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sories to be placed in position between the collimator and prism. A protective cover for prism table is also supplied.

(2) The accessories stand on a brass plate capable of slight rotation by means of a milled-head screw. This, together with a readily accessible levelling screw, provides the necessary adjustment for each of the accessories.

(3) The slit of the collimator is longer than that of the slit generally supplied with the W.L. Spectrometer, this being desirable for use with the Etalon. A second slit is attached to the main slit, the jaws running at right angles to it. This second slit can be rotated into or out of position as desired, and is necessary for use with the Echelon. This cross slit is shown in Figs. 3 and 4. The Echelon is mounted with the edges horizontal in the manner employed by Michelson.

(4) An extra low-power eyepiece is supplied for use with the Etalon or Lummer-Gehrcke Plate.

(5) The base plate is of the form shown in the frontispiece.

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PRICES

Modified Wavelength Spectrometer, with extra dense prism, refractive index for $D = 1.74$, suitable for the Lummer Plate or Fabry & Perot Etalon £70 10 0

If to suit the Echelon, in which case the collimator arm requires to be extended . £75 0 0

Accurate micrometer eyepiece for measuring the diameter of the ring system produced by the Etalon, or for employment with the Echelon or Lummer-Gehrcke Plate; with adapter for low-power eyepiece interchangeable with that for the usual eyepiece supplied £13 5 0

USEFUL ACCESSORIES FOR THE DEMONSTRATION OF THE ZEEMAN EFFECT BY MEANS OF THE LUMMER-GEHRCKE PARALLEL PLATE

Small electro-magnet on raising and lowering stand, pole pieces adjustable from contact to $\frac{1}{2}$ inch ($12\frac{1}{2}$ mm.) apart; suitable for demonstrating the Zeeman effect with the Lummer-Gehrcke Parallel Plate. The current required is about 3 amperes when using an ordinary vacuum tube as the source of

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light. The lines are distinctly separated into triplets, etc. £11 0 0

Shutter eyepiece with bright pointer and double image prism, for Zeeman effect observations with the Lummer-Gehrcke Parallel Plate. By means of the shutter eyepiece the line under observation can be isolated, and the double image prism being turned into position, the components of the rays polarised in vertical and horizontal planes can then be observed side by side simultaneously. The surfaces of the double image prism are protected by glass plates £13 0 0

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