

THE CAMBRIDGE
SCIENTIFIC INSTRUMENT COMPANY, LTD.,
CAMBRIDGE, ENGLAND.

THE CAMBRIDGE EXTENSOMETER.

PATENT No. 2983. 1908.

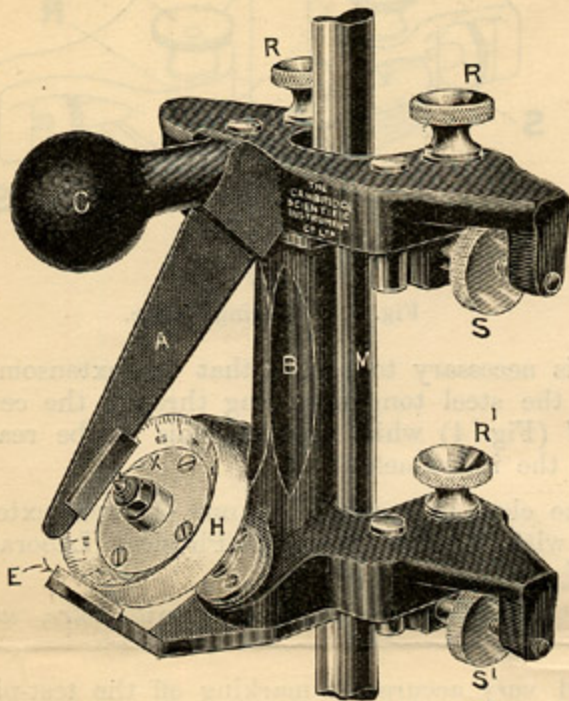


Fig. 1. $\frac{1}{2}$ full size.

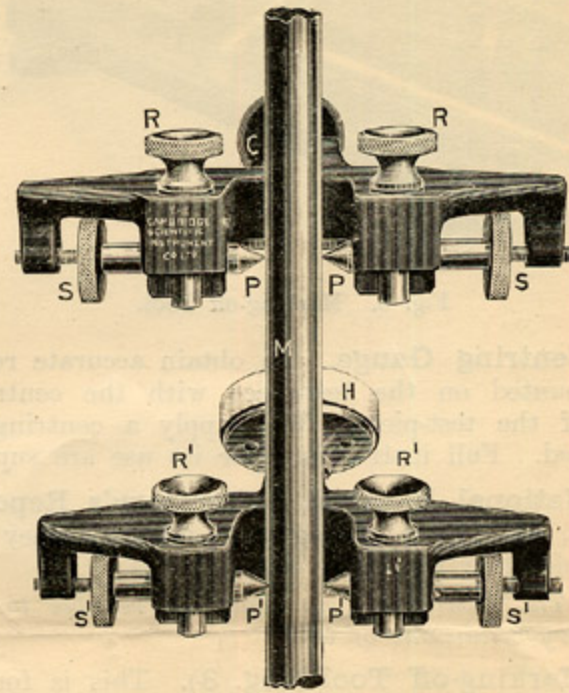


Fig. 2. $\frac{1}{2}$ full size.

This instrument, for measuring the elastic extension and Modulus of Elasticity of specimens of metal under tensile loads, has been designed to resemble a workshop tool rather than a scientific instrument. Having no delicate parts, mirrors, or microscopes, it is not easily damaged, and yet it gives very accurate readings as will be seen from the report issued by the National Physical Laboratory from which we quote later. Indeed, as regards accuracy the instrument compares favourably with other patterns at more than twice the price.

Construction. The instrument is made in two separate pieces each of which is separately attached to the test-piece *M* by hard steel conical points *P*, *P* and *P'*, *P'*. The steel rods carrying these points slide in geometric slides and after being driven gently into the centre punch marks in the test-piece are clamped in position by the milled heads *R*, *R*. Both parts of the instrument should be capable of rotating quite freely about the points but there must be no backlash.

The lower piece carries a micrometer screw fitted with a hardened steel point *X* and a divided head *H*. It also carries a vertical arm *B* at the top of which is a hardened steel knife-edge. The upper and lower pieces work together about this knife-edge. A nickel-plated flexible steel tongue *A* forming a continuation of the upper piece is carried over the micrometer point *X*. This tongue acts as a lever magnifying the extension of the specimen so that the movement of the steel tongue to or away from the steel point *X* is five times the actual extension of the specimen.

To take a reading with the extensometer the thin steel tongue *A* is caused to vibrate and the divided head then turned till the point *X* just touches the hard steel knife-edge on the tongue as it vibrates to and fro. This has proved to be a most delicate method of setting the micrometer screw, as the noise produced and the fact that the vibrations are quickly damped out indicate to $\frac{1}{1000}$ mm. the instant when the screw is touching the tongue. After the load is applied a second reading is taken in a similar manner and the difference in the readings gives directly the extension of the test-piece.

If the test-piece is of small diameter the spring does not vibrate in so satisfactory a manner; the cause of this is the flexibility of the test-piece, the instrument itself vibrating as well as the spring. Still very delicate readings can be taken by simply deflecting the spring with the finger and noting the contact as it passes the point. No damage can be done by advancing the micrometer screw too far forward; all that happens is that the point passes the knife-edge on one side or the other.

Dimensions. The standard instrument is suitable for use on specimens up to 20 mm. or $\frac{3}{4}$ in. diameter, the centre points P, P' being 100 mm. apart. We have also made an instrument with the centre points 2 in. apart, and are prepared to consider designing instruments for other lengths.

Referring to the standard instrument for 100 mm. the pitch of the micrometer screw is $\frac{1}{2}$ mm. and the head is divided into 100 parts. As the lever multiplies five times, each division on the head corresponds to an extension of the test-piece of $\frac{1}{1000}$ mm., and as the tenths of divisions can be estimated by eye, readings can be taken to $\frac{1}{10,000}$ mm. although it is not claimed that the results are trustworthy to this degree of accuracy. The effective length of the test-piece being 100 mm., readings can be taken to $\frac{1}{1,000,000}$ of the length of the test-piece by estimation.

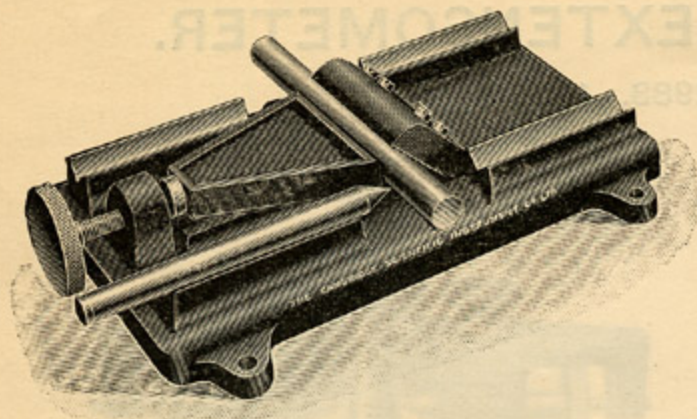


Fig. 3. Marking-off Tool.

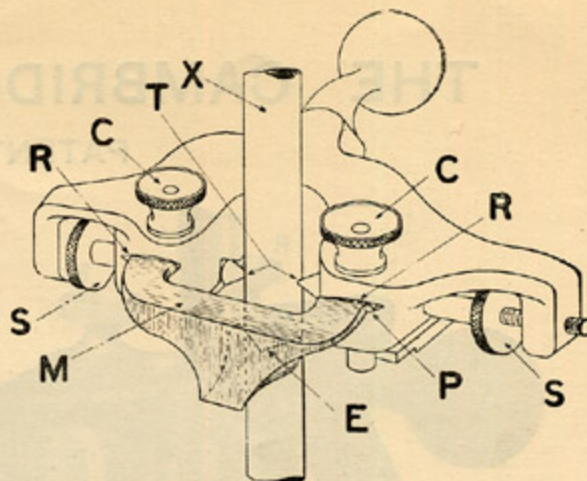


Fig. 4. Centring Gauge.

Centring Gauge. To obtain accurate readings it is necessary to ensure that the extensometer be mounted on the test-piece with the centre line of the steel tongue passing through the centre line of the test-piece. We supply a centring gauge M (Fig. 4) which enables this to be readily obtained. Full instructions for its use are supplied with the instrument.

National Physical Laboratory's Report. At the close of a report on one of these extensometers, and after giving the readings they obtained with it, the National Physical Laboratory conclude their report by stating:

"The instrument is evidently reliable to about the one-thousandth part of a millimetre, under ordinary conditions of test."

Marking-off Tool (Fig. 3). This is for easily and very accurately marking off the test-pieces for the extensometer. It consists of a cast-iron base having two V grooves running lengthwise along it, their centre lines being exactly the same distance apart as the centre points P, P' . These grooves are cut away midway along their length, permitting the test-piece to be clamped in another groove which runs across and at right angles to the first groove. A hardened steel centre punch slides in the grooves, and by tapping it with a hammer the test-piece is truly marked off. The point of the centre punch has three small flats on it so that it actually makes a triangular hole in which the conical points of the extensometer fit geometrically without any play.

ADVANTAGES OF THE CAMBRIDGE EXTENSOMETER.

- (1) *No microscopes, mirrors or optical parts are used, and the readings can be taken with great ease and rapidity.*
- (2) *It is strongly made, is very simple, and has no parts likely to get out of order.*
- (3) *It consists of two free parts so that if a specimen unexpectedly breaks the extensometer is not seriously damaged.*

PRICES.

Catalogue No.	Description	£	s.	d.	Code Word
2050	Cambridge Extensometer in mahogany case complete with centring gauge. For centres 100 mm. apart	10	0	0	Milliped
2049	Cambridge Extensometer in mahogany case complete with centring gauge. For centres 2 in. apart.	10	0	0	Millioned
2054	Marking-off Tool. For centres 100 mm. apart	2	2	6	Maygame
2053	" " " For centres 2 in. apart	2	2	6	Mayflower

N.B. Our prices do not include packing or carriage. The former is charged for at cost price, but full credit is allowed when the packing is returned to us promptly and in good condition.

We allow a discount of 2½% for cash received within 1 month of the date of our invoice.

Other leaflets, which will be sent post free on request, deal with:—A Repeated Impact Testing Machine, Radiation Pyrometers, Resistance Pyrometers, Thermo-electric Pyrometers, etc., etc.

PLEASE ADD 10% TO ALL THE LIST PRICES.
The Cambridge Scientific Instrument Company Ltd.