

*A Students' Goniometer.*¹

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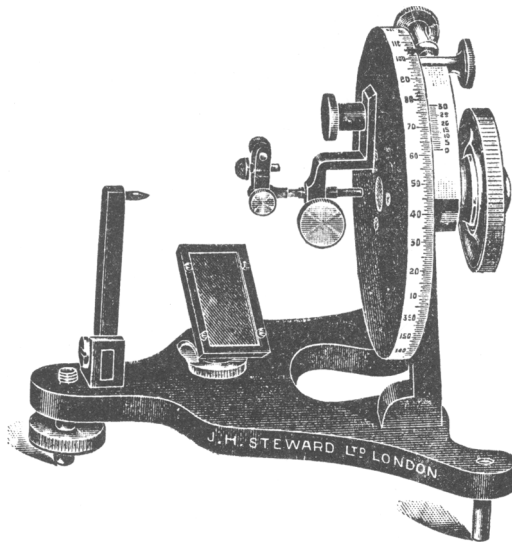
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THIS form of goniometer was designed in order to provide for the use of students of elementary crystallography, at as moderate a cost as possible, an efficient instrument for the measurement of the interfacial angles of crystals. It is of the customary type, in which the direction of reference is given by the reflection of a distant object in a small plane mirror without optical aid, and the axis of the graduated circle is horizontal. The mirror measures about 45 by 25 mm. and its frame is rigidly attached to the ball of a ball and socket joint, so that it is adjustable in any direction; the socket is split, and a screw linking the halves enables it to grip the ball firmly. The pillar carrying the socket passes through a split collar, slightly tapering in shape, which may be clamped by means of a butterfly-nut; when released, the mirror may be adjusted to the requisite distance from the axis of the graduated circle. The base stands on three legs, one of them being adjustable vertically, which are placed so as to assure complete stability of the instrument during use. The graduated circle, which is 5 inches (12.5 cm.) in diameter, is provided with a clamp and fine adjustment of the ordinary type. Its scale, which is silvered to facilitate the readings, is divided to half degrees, and is read by means of a vernier to minutes of arc.

The method of adjusting the crystal to be measured presents greater novelty. The crystal-holder itself is of the ordinary type, a small circular plate fixed to the top of a short, thin pin, which passes through a socket and can be clamped firmly by means of a screw. The short arm carrying the clamping-piece is hinged at its lower end, and can itself be firmly clamped by a screw forming the pin of the hinge. The co-ordination of these two motions in varying proportions suffices for the adjustment of an edge on the crystal parallel to the axis of the graduated circle, and enables the crystal, as regards one half of it, to be completely measured without re-adjustment on the wax, no small convenience if the crystal be small. The hinge referred to is attached to a horizontal pin passing through a split collar, which may be tightened by means of a screw.

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This collar is carried on an arm, which is bent away from the plane surface of the graduated circle for convenience of access to the head of the screw operating it. The arm in turn is pivoted at a point on the flat face of the graduated circle about 3 cm. from its centre, and the central line of the collar and therefore also of the pin passing through it is of precisely the same length; consequently, rotation about the pivot carries the central line of the horizontal pin through the axis of the graduated circle. The arm may be fixed by means of a screw forming



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the pivot. To prevent the arm dropping on release of the screw owing to want of balance about the pivot, the screw bears on a small spring surrounding it, which is carried in a collar fixed to the arm; the friction is sufficient to keep the arm steady. This second pair of movements forms the means of adjusting the crystal into the line of axis of the graduated circle, while the lengthwise movement of the horizontal pin within its collar, when released, permits of the crystal to be set above the plane mirror. To facilitate this adjustment, a pointer (on the left in the figure) is provided; when not required, it can be swung out of the way, but is readily brought into position by turning its arm until it comes against the stop.

The instrument was constructed by Messrs. J. H. Steward, Ltd., 406 Strand, London, W.C. 2.