

The normal-pattern finder: an aid to stereographic projection.

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Summary. The normal-pattern finder is a mechanical aid for use in finding the various possible configurations of a construction in the Barker system for anorthic crystals. Its purpose is to avoid the drawing of zones in pencil on the stereographic projection, which zones make it more difficult to recognize other differently constructed normal-patterns.

THE instrument here described was devised as an aid in the application of the Barker method of determinative crystallography to anorthic crystals, but is also useful in a variety of optical and other problems handled in stereographic projection.

A fundamental step in the Barker system is to seek out all ways in which as many as possible of the observed faces can be assigned 'simple' indices, defined as indices including only the numbers 0, +1, and -1; the thirteen possible pairs of parallel faces with simple indices lie at the intersections of the nine zones [100], [010], [001], [110], [1 $\bar{1}$ 0], [101], [$\bar{1}$ 01], [011], and [0 $\bar{1}$ 1], which map out a 'normal pattern'. The normal-pattern finder is primarily a device for testing whether any given group of poles in a stereographic projection can be located in a normal pattern, and avoids drawing large numbers of zone-circles (which may be an obstacle in recognizing a different normal pattern, involving a different selection of poles).

The instrument consists of an assembly of two metal rings (*a* and *b*), held together by three small metal plates (*c*) so as to form a slot through which the six screws (*d*) can slide. These screws (*d*) clamp the sliders (*e*) by means of the milled nuts (*f*).

The sliders each carry four wire-holders (*g*) and a clamping mechanism for these. Through each of the wire-holders is bored a small horizontal hole through the three lowest of which are passed steel wires of 0.3 mm. diameter. Each wire can be clamped firmly under the wire-holder that lies immediately above it by turning the screw (*h*). The wire-holders are also provided with a hole of 2 mm. diameter bored through in a vertical

direction. When the screw (*h*) is loose the holders can be turned freely on one another.

There are three pairs of sliders (*e*), each pair consisting of one long and one short. In the case of the short sliders the wires are pushed through

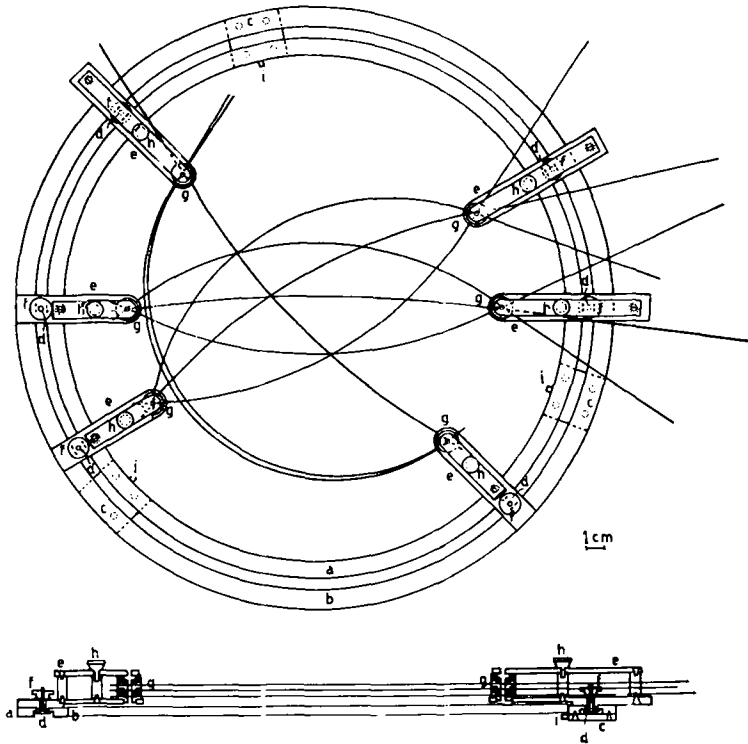


FIG. 1. The normal-pattern finder.

without any overlapping ends; with the long ones the wires are allowed to protrude. The wires should be of such a length that when bent into the form of a semicircle between the sliders they protrude about 4 cm. through the longer slides.

The whole instrument can be laid on a stereographic net (e.g. such as that supplied by Leitz) in such a way that the pegs (*i*) engage with slots formed in the movable outer ring of the net.

If two of the sliders (one pair) are now placed above two diametrically opposite face-poles on the base circle (these poles may be observed through the holes bored in (*g*)) the steel wires can be given the form of

great circles in the stereographic projection merely by pushing the wire in or out of (*g*) and turning (*g*). With the aid of the three sets of sliders (9 wires in all) all the different possible normal-patterns may be formed.

Thus, given a number of face-poles, the various possible configurations can be sought by means of this instrument, the projection remaining all the time unmarked. Without such an instrument it is usually necessary to mark the various zones in pencil before the normal-pattern can be recognized; the existence of these lines then makes it more difficult to recognize other differently constructed normal-patterns.

In order to ascertain whether a given face-pole in the projection coincides with an intersection of the wires, a small half-silvered mirror may be used; by making the image of the wires coincide with the wires themselves it is possible to ensure that readings are made in a truly vertical position.