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Method of obtaining X-ray rotation photographs about three orthogonal axes from one crystal mounting.

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If a crystal is mounted in the usual way on a glass fibre approximately parallel to the desired axis of rotation, say [100], it must in general be remounted for rotation about the axes [010] and [001]. Remounting can be avoided by an auxiliary arc system (Fig. 1) enabling the pip holding the fibre to be directed along any ⟨111⟩ direction (here [1$\bar{1}$1]) of the orthogonal axial system defined by the lower arc screw AX, the upper arc screw AY and the rotation axis AZ. Successive rotations of the pip through 120° bring three orthogonal directions in the crystal in turn parallel to each of the three axes AX, AY, AZ.

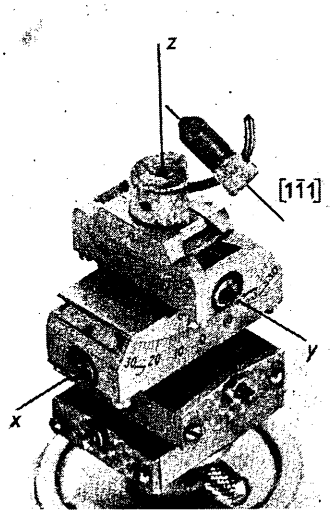

Fig. 1. Auxiliary arc system in position.

A crude approximation to the cubic [1$\bar{1}$1] direction, such as may be obtained with the arrangement of corks and wire shown here, is quite adequate, since the approximate location of two crystal axes parallel to the upper and lower arcs enables the third to be set accurately vertical in the usual way.

This arrangement is still useful even when it is not possible to glue the fibre approximately parallel to a cubic ⟨111⟩ direction relative to the crystal axes, and it must be placed parallel to one of these axes, say [100]. By sliding the pip on the curved wire, the fibre can be made vertical for the [100] rotation, or horizontal for, say, the [010] rotation; a 90° rotation of the fibre in the horizontal position then brings the [001] axis vertical. When the fibre is horizontal a small region (about 15° with this particular mount) of the zero layer of the reciprocal lattice is obscured.

This auxiliary arc system was devised when only one, easily deformed, crystal of a material was available, but it was found so useful that it is now being employed as a matter of routine.

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The intermetallic compounds $MgBe_{13}$ and $CaBe_{13}$.

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Powder photographs of certain beryllium–magnesium and beryllium–calcium compounds have revealed that the structures are face-centred cubic with $a \simeq 10$ Å. This suggested that the compounds are isomorphous with the MBe_{13} compounds reported by Baenziger & Rundle (1949). Confirmation of this was obtained by intensity calculations, using the parameters found by Shoemaker, Marsh, Ewing & Pauling (1952) for $NaZn_{13}$.

The values for the lattice parameters are:

$$MgBe_{13}\colon\ a = 10{\cdot}166 \pm 0{\cdot}005\ \text{Å};$$
$$CaBe_{13}\colon\ a = 10{\cdot}312 \pm 0{\cdot}001\ \text{Å}.$$

The magnesium compound was formed by powder metallurgical methods, and the calcium compound by calcium reduction of the oxide.

References

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