



Fig. 5.4.--Subdivision of a single grain by martensitic plates. A and B are first and second generation plates, respectively.

for the amount of martensite formed. The amount of martensite formed has been found proportional to the difference between transformation temperature and the lower reference temperature and independent of time, within the resolution of such experiments.

#### 5.2.4. Fraction Transformed in Athermal Transformation

Athermal martensite appears to grow from a finite number of nucleation sites, which are eventually exhausted. Magee<sup>47</sup> has been successful in explaining athermal results by assuming the number of new plates in the untransformed volume to be proportional to increments in "driving force,"  $G_{21} = G_2 - G_1$ , where  $G_2$  and  $G_1$  are the Gibbs energies for phases 1 and 2, respectively, at the existing pressure and temperature. He has proposed that the number of new sites per unit volume,  $dN$ , available to transform is

$$dN = -K(1-f') d(G_2 - G_1) \quad (5.1)$$

where  $K$  is a positive constant and  $f'$  is volume fraction of martensite.

This equation contains the implicit assumption that the final state is the state for which  $f' = 1$ , whereas observations show that  $f' = 1$  is never quite reached.

If each cluster of plates contains nearly the same volume of martensite, then the volume fraction transformed is proportional to the number of new plates formed per unit volume: