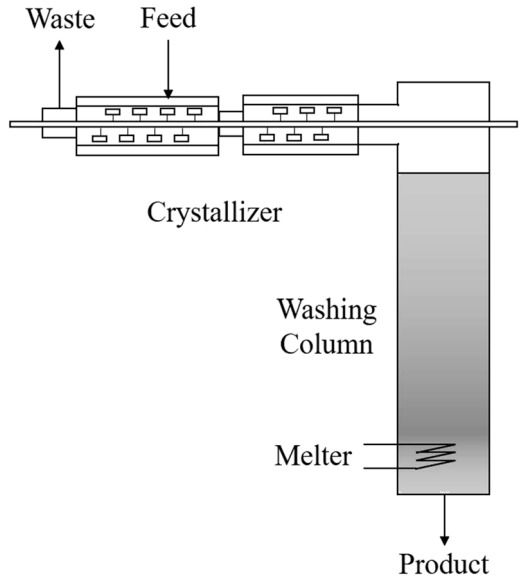

Figure 11.7 Brodie crystallizer.

phenomena, slow stirring is adopted in the purification column. As the first industrial melt crystallizer operated continuously in the world, the Brodie crystallizer has many advantages, including low operation cost, less safety problems, less capital and maintenance expenditure, higher purification effect, and so on. It can guarantee the purity of target materials if the raw materials concentration stays within 11%, which means a big operational flexibility.

11.4.1.7 TNO Purifier

The TNO purifier,[1,3] shown in Figure 11.8, was developed in the Netherlands in 1972. In addition to a countercurrent washing process, the mass transfer between liquid and solid is further promoted by the mechanical action on the crystals in the TNO purifier. Combinations of balls and sieve plates in the washing column could result in damaging, breaking, or grinding of the crystals. As a result, suspension of crystals with very different particle sizes will be obtained and Ostwald ripening processes happen, in which small crystals melt and big crystals grow. Therefore, impurities incorporated in the crystals could also be separated and the separation efficiency of per unit of length could be increased significantly. In the TNO purifier, slurry is fed in the middle of the column and the waste and product are taken out from the top and bottom of the column, respectively.