In this study, the plaster stemming application for blasting at a basalt quarry is studied. Drill cuttings are generally used in open pits and quarries as the most common stemming material since these are most readily available at blast sites. However, dry drill cuttings eject very easily from blastholes without offering much resistance to blast energy. The plaster stemming method has been found to be better than the drill cuttings stemming method due to increased confinement inside the hole and better utilization of blast explosive energy in the rock. The main advantage of the new stemming method is the reduction in the cost of blasting. At a basalt quarry, blasting costs per unit volume of rock were reduced to 15% by increasing burden and spacing distances. In addition, better fragmentation was obtained by using the plaster stemming method. Blast trials showed that plaster stemming produced finer material. In the same blast tests, +30 cm size fragments were reduced to 47.3% of the total, compared to 32.6% in the conventional method of drill cuttings stemming. With this method of stemming, vibration and air shock values increased slightly due to more blast energy being available for rock breakage but generally these increased values were small and stayed under the permitted limit for blast damage criteria unless measuring distance is too close.