In this study, a newly developed plaster stemming method is studied and compared with the usual dry drill cuttings stemming method for surface blasting in mines and quarries. 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. In one series of blast tests, blasting costs per unit volume of rock were reduced to 16 per cent by increasing burden and spacing distances. Also, 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 reduced to 5.4 per cent of the total, compared to 37.7 per cent 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 these increased values were small and under the permitted limit for blast damage criteria.