and where fortunes can be realized by employing improved machinery for crushing and saving the gold.

Since the Bertrand Mill-owners have adopted rolls, other mill-owners have followed in their footsteps; and the results have been so satisfactory that it leaves no room for doubt of the superiority of rolls to stamps. The short time that rolls have been in use has not enabled the quantity they are capable of crushing to be accurately determined, as the quantity is limited to the area of the screens that have been attached to them; but enough is known respecting their capabilities to recommend them for general use. It has been found that two sets of rolls 15in. long and 26in. in diameter, travelling at a velocity of one hundred revolutions per minute, is equal in efficiency to a crushing-battery with fifty heads of stamps, 7cwt. each, having 10in. drop, and making seventy-five blows per minute. To enable a comparison to be made between the cost of a stamping-battery of fifty heads and two sets of rolls, the number of working-parts must be taken into consideration, as each part contributes to the wear and tear and cost of maintenance. The following will show the different pieces of each of the systems: Crushing-battery: Bearings on intermediate shaft, 6; bearings on cam-shaft, 11; plummer-blocks for intermediate and cam-shafts, 17; stamp-shanks, 50; stamp-head bosses, 50; shoes for stamps, 50; false bottoms for stamps, 50; cams for lifting stamps, 50; dies on stamps-hanks, 50; guides for stamp-shanks, 100: total number of working parts, 434. Two sets of rolls: Bearings on shafts of rolls, 4; plummer-blocks for same, 4; crushing-rolls tires, 4; side-plates, 4; wearing surfaces for each two sets of rolls, 12: total number of working-parts, 28. The working-parts of the stamping-battery are subject to rapid wear, and many of them are liable to break, but most of them can be easily replaced; still, the large number of working-parts, although many of them are small, require constant care and attention to keep them in a proper state of repair so as to prevent a stoppage of the machine. Stamps and shanks are very liable to break; and, although they are readily replaced, the time employed in doing so in course of a year is considerable. The screens have not been taken into account, as they are common to both machines; although the wear and tear on the gratings of the stamp-mortar must be greater than that for the rolls, as the stamps thrust the crushed material with considerable force against the gratings, whereas the crushed material from the rolls is by gravitation. The wear in rolls is almost exclusively confined to steel tires and cheek-pieces. Of the steel tires 80 per cent. can be safely used in crushing before it is necessary to replace them; whereas it is not generally safe to wear more than 60 per cent. of the shoes and false bottoms of the stamping battery. The statistics of the wear and tear on rolls is as yet confined to the Bertrand Mill, where two sets of rolls crushed 20,000 tons of ore in about 250 days. This time is estimated, as the rolls now are crushing about a hundred tons per day; but when first starting they did not put through so large a quantity. During the time they were at work two new sets of tires were used, and cheek-pieces, which they got from New York. The cost will be as follows: Two sets of steel tires, at foundry, £153; cheek-pieces, £60; freight on same, allowing ample margin, £100: total, £313. The wear and tear in twenty-four hours would therefore be, including labour in effecting repairs, about £1 10s.

Mr. T. Egleston, Ph.D., in writing on this subject in *Engineering* of the 13th and 20th November last, says: "These rolls are now in successful operation at the Bertrand Mill and Cory Mill, in Nevada, and the Haile Mine, in South Carolina. It has been shown recently that two sets of 26-inch rolls at the Bertrand Mill can easily crush 150 tons of hard ore in twenty-four hours so as to pass threugh a No. 16 screen. How much more they can do is not known, as they have never had full screen and elevator capacity. The Mount Cory Mill has crushed, in the same time, 50 tons through a No. 30 screen. The usual capacity for the best stamps on the same kind of ore is 2 tons per stamp, which makes the rolls equal to a fifty-stamp mill. At the Bertrand Mill 9,000 tons of ore were crushed without paying a dollar for repairs, with the expenditure of less than one-half the power required to do the same amount of work in a stamp-mill; while the total repairs up to date have been only about one-quarter cost of the stamp-mill repairs, at this mill 15,000 tons of ore passed through the fine-crushing rolls before new tires were necessary. After crushing 20,000 tons the coarse-crushing tires were still good for two months' wear. It is considered that each set of rolls, with a set of repair-linings of composition metal, would be capable of crushing 20,000 tons, the only expense for repairs being tires and cheek-pieces. The cost for renewals for a set of 26-inch rolls during 1885 will be—Two sets of tires, $530; freight on 3,204lb., at 3 cents, $98; composition lines for journals and cheek-pieces, $100, total, $728—say £145. For comparison of expenses we will assume that two sets of 26-inch rolls are equal to a thirty- and not a fifty-stamp mill, as has been shown by actual experiments, and the thirty heads of stamps, weighing each 850lb. to 900lb., dropping eighty to eighty-five drops per minute, with a fall from 7in. to 9in. It has been found at the Bertrand Mill that two sets of 26-inch rolls, with a consumption of four cords of firewood, will crush a hundred tons of moderately-hard quartz or other ore in twenty-four hours, so that it will pass through a No. 16 screen. A thirty-stamp mill, to do the same amount of work, will consume six cords of firewood; thus showing that the rolls only take two-thirds of the power to do the same amount of work as a stamping-battery. To take the first cost of the plants (as shown in 'The Production of Gold and Silver in the United States,' Washington, 1883), a thirty-stamp mill costs as follows, erected at Nevada: Plant at foundry, Chicago, $5,850; freight to locality, $2,718; lumber in erection, $1,800; cost of erecting, $4,000; cost of buildings in excess over a building for rolls, $1,500; cost of engine-boilers, excess over rolls, $1,250: total, $17,118. The cost of two sets of 26-inch