

"In comparing the cost of milling in the 80- and 120-stamp mills it seems strange that there should be so little difference. Special causes must have affected this year's work, for the cost per ton in 1880 was 5s. 4d. and 3s. 2½d. respectively. The cost of milling at the Caledonia mill for 1887-88 was 3s. 6½d. per ton, 1s. 3d. being for labour, and 2s. 3d. for material. This is a low figure, if we consider that the mill has only sixty stamps, and that the ore treated is very hard in comparison with any Homestake rock.

*"Labour in the Mills.*

"All heads of the different departments are responsible to the superintendent. The mill proper is in the charge of a foreman thoroughly acquainted with every detail of work. One foreman often has the general charge of several mills, as with the Homestake and Deadwood-Terra Companies. Next comes the millwright, who sometimes has, as in the Homestake mill, an assistant, called the pipe-fitter. The millwright comprises the trades of carpenter and machinist. His duty is to make the guides, put them in place, and keep them in order; to exchange cams and cam-shafts, fasten any cams that may become loose, make and replace screws, make and repair chuck-blocks, to reverse and exchange shoes and dies of crushers, and to look after all the piping in the mill—in one word, to erect and keep every part of the mill in order for which any mechanical knowledge is required. One of his duties, for example, consists in lining all the shafts, and babbitting their boxes.

"In this connection might be mentioned a method of lining shafts which originated with the millwright of the Homestake Company, and which has proved to be quick and effective. When a shaft has to be lined the boxes are placed so as to be approximately in line. The lower bearing, which is to receive the shaft, is loosely packed with clay, and a wooden centre pressed into it. This consists of a semi-cylindrical piece of dry wood, having the same diameter as the shaft, and about the length of the box. The wooden centres of the two or more boxes are now carefully lined, and the clay packed around them. When in line, the centres are removed one after another, and the clay cut out crosswise in the middle of each box. The centre is then replaced, and the hollow space filled by pouring in babbitt metal. The centre and the remaining clay are then removed, and upon the ribs of babbitt, in the middle of each box, is placed the shaft, which is now accurately in line. Finally the space left is filled with babbitt-metal. In this way the shaft can be quickly and accurately lined, the bearings will be absolutely true, and the lining from ¼ in. to ½ in. thicker than the ordinary ¼ in. lining; consequently the shaft will last longer.

"After the millwright comes the machinist. The Homestake Company having a large shop, all repairs are made there. At the Caledonia mill the foreman is also a machinist, and any extensive repairs are made by the Homestake Company.

"As the mills are driven by steam, each one has two engine-men, who are responsible for their foremen. To guard against fire or any accident there is generally a night-watchman for every mill. These men are directly responsible to the foreman.

"The man who has the immediate charge of running the mill is the head amalgamator. He also stands directly under the foreman, and is responsible for all his assistants—the amalgamators, crusher-men, oilers, feeders, and day-labourers if there are any. As, in addition to running the mill, he has charge of the collecting and safe-keeping of the amalgam, he must be thoroughly trustworthy, as well as capable. The amalgamators feed quicksilver, regulate the water-supply, set tappets, renew shoes, dies, screen, and chuck-blocks, and look after the running of the battery in general. Quicksilver is fed by the hand every half-hour with a little wooden spoon, similar to a mustard-spoon. The quantity required in twenty-four hours ranges from ¼ lb. to ½ lb. for every battery, according to the character of the ore, which varies a good deal. The correct amount is found by the 'feel' of the amalgam collected on the apron plates. If this be hard and crumbly, there is danger of amalgam being carried off by the pulp, and more quicksilver is added. On the other hand, if too much quicksilver is fed into the mortar, the plates become too soft and slippery, less amalgam collects on the inner plates, and there is a danger of liquid amalgam rolling off the apron-plates. Two methods of adding quicksilver are in use. At the Homestake mills all the quicksilver is added in the mortar, and the amalgam obtained is of medium hardness. At the Caledonia mill it is the aim, by adding only part of the quicksilver in the mortar, to make the amalgam on the inside plates as hard as may be, and to add the rest to the apron-plates, keeping these somewhat softer than those of the Homestake mills. Each management is satisfied with its own way of feeding the quicksilver, and it would be difficult to decide in favour of either method. Perhaps the fact that the Caledonia ore has, on the whole, coarser gold than the Homestake ore, may explain this difference in feeding.

"The entire loss in quicksilver incurred by the Homestake management a year per stamp is 5.27 lb., or, according to the tons of ore milled by the Homestake and Golden Star mills, 0.0044 lb. per ton of rock crushed. The entire loss incurred by the Caledonia mill is 7 lb. a year per stamp, or 0.011 lb. per ton of rock crushed. Of course, with the hard and strongly-mineralised rock the Caledonia mill has to crush, more quicksilver will be floured per stamp than with the Homestake rock; and on account of the smaller quantity of rock crushed per stamp, less quicksilver is consumed per ton.

"The amount of water required will vary according to the specific gravity of the rock, the percentage of sulphurets, and the incline of the apron-plates. An excess of water will make the pulp in the mortar too thin, thus preventing an intimate contact with gold and quicksilver; will assist coarse crushing, and will hinder the settling of amalgam on the apron-plates. Too little water will assist amalgamation, but will hinder the pulp from passing the screens, and will not carry that which has passed through them. As a rule it is better to use too little water than an excess. The right amount will just convey the pulp evenly over the apron-plates. The Homestake mills use, in twenty-four hours, 1 in. of water for each battery. The Caledonia mill uses 1½ in.

"The setting of tappets is necessary, so that the stamps may always have the same height of drop, whether the shoes and dies are new or somewhat worn down. To accomplish this the stamps are hung up, the mortar opened, the stamps then lifted up by means of an iron bar used as a lever,