

squeezing the pasty amalgam is first purified by adding some nitric acid, stirring it, and then washing it with water. The clean-up in the middle of the month is much simpler than that on the 1st, as only the chuck-blocks are taken out, and the mortar is left intact, except, of course, when any break has occurred in a shoe or die. On the 15th, however, the mercury-traps are cleaned; their contents go simply into the pan and are worked with the rest of the products containing amalgam. This clean-up lasts five hours; that is two hours less than the one on the 1st of the month.

"The cleaning-up of old iron and wood chips which is done once a year still remains to be mentioned in this connection. The pieces of iron picked out of the sands in the bottom of the mortar are first scraped to remove any amalgam adhering to them. They are then thrown into an enclosed heap in the yard and left there to be corroded by atmospheric action; the rusting is hastened by adding some salt to the heap at various times. Once a year the iron that has fallen to pieces is charged with quicksilver into the pan and its gold extracted. The chips of wood which float on the top of the water in the battery, and often clog the screens, are repeatedly removed and collected in a box in one of the window recesses. They are then emptied on a heap in the yard, and once a year are set on fire. The ashes are collected and amalgamated in the pan. In this way are saved from 16lb. to 18lb. of amalgam from the two mills of the Homestake Company—200 stamps.

"*Retorting and Melting.*—The quicksilver still retained by the hard amalgam is removed by retorting. Both bulb retorts and cylindrical ones are used. The cylindrical retort of the Homestake Company is 12in. in diameter and 3ft. long, and holds about 1,000lb. of amalgam. The usual charge of 500lb. is retorted in about six hours with a quarter of a cord of wood. The loss in quicksilver is nominal. The retort metal amounts to 38 or 40 per cent. of the original charge. At the Caledonia mill it is only 33 per cent. less, care being taken in cleaning the amalgam; and at the Deadwood-Terra mills it is often only 25 per cent., by reason of the fine condition of the gold, which requires more quicksilver to form amalgam.

"The retort metal is now melted into bars. At the Homestake mill two kinds of moulds are used—the 1,500oz. mould, 5in. by 5in. by 11½in., and the 700oz. mould, 3½in. by 4in. by 9½in. The bars are cast from 3in. to 4in. thick, and weigh from 1,000oz. to 1,400oz. It takes about four hours to melt four 1,400oz. bars, and the crucible lasts from six to eight charges. The loss in melting with the Homestake retorted bullion is 1·5 per cent., and the average composition of the bars is 820 gold, 165 silver, and 15 base metal. The loss in the Caledonia bullion is greater—7 per cent.—as less care is taken in cleaning the amalgam; the average composition of the bullion is 798 gold, 182 silver, and 20 base metal.

"Working Results.

"The Homestake and Golden Star mills together produced, according to the report of the Homestake Company for the year ending June, 1888, gold worth £184,445 from 243,355 tons of ore, which corresponds to a yield in free gold of 15s. 2d. per ton. It is claimed that 85 per cent. of the free gold is saved. According to this, the ore would run in free gold to the value of 17s. 7d. per ton. Two sets of experiments were made in the spring of 1885 by Dr. R. Goering on the Homestake and Golden Star tailings—the first when the mills had no mercury-traps, the second after these were introduced. Up to that time there had been collected, by means of blankets in a separate building, 1,124 tons concentrates, which assayed £7 3s. 4d. per ton. These panned down gave 20·5 per cent. of cleaner concentrates, which gave an assay-value of £8 3s. 7d. per ton. When amalgamated in the pan they yielded 56·9 per cent. of their total value, the remaining pure pyrites assaying a value of £3 9s. per ton. This shows that the gold recovered must have been either enclosed in quartz, or rusty, or that amalgam had been carried off with the tailings, and was recovered by the blankets. When, in consequence of these tests, the mercury-traps were introduced the loss was reduced. The concentrates then assayed a value of £5 12s. 9d. per ton. They gave 92 per cent. of the gold in the pan, but the pure pyrites still assayed a value of £2 10s. per ton, showing that, while the loss had diminished, it had not been stopped. The concentration of tailings by blankets, being too expensive, was given up.

"The Caledonia mill crushed, for the year ending May, 1888, 73,425 tons of ore, and produced bullion worth £60,395, equalling a yield of 16s. 3d. per ton. It may, however, be stated that the blanket concentrates of the Caledonia amalgamated raw in the pan yield a product of pure pyrites giving an assay-value of £18 7s. 6d. per ton, and that the tailings from the blankets, when panned, yield concentrates of a value from £1 8s. 7d. to £1 16s. 9d. per ton. The following table shows the cost of milling in 1887–88 at Homestake and Golden Star mills:—

Items.	Homestake Mill, 96,790 Tons treated.		Golden Star Mill, 146,565 Tons treated.	
	Amount expended.	Cost per Ton.	Amount expended.	Cost per Ton.
Labour	£ 5,081 18 7	s. 1 0·60	£ 6,424 8 3	s. 0 10·32
Supplies	259 1 2	0 0·64	235 13 5	0 0·39
Water	3,429 18 7	0 8·51	5,144 12 1	0 8·42
Wood	5,488 11 4	1 1·60	8,232 1 8	1 1·47
Machinery	1,829 8 8	0 4·54	3,666 8 4	0 6·00
Oil	215 16 0	0 0·53	252 16 2	0 0·41
Candles	31 19 7	0 0·07	43 19 5	0 0·07
Quicksilver	205 5 2	0 0·50	758 14 4	0 1·24
Lumber	140 4 8	0 0·34	163 16 7	0 0·26
Total	16,682 3 9	3 5·25	24,927 10 3	3 4·75