

the new plate may become normal. This takes from two to four weeks, during which time the plates are continually discoloured by copper salts. To get these into solution, potassium-cyanide or ammonia is added to the battery-water. At the Caledonia mill the procedure is similar, only more care is taken to saturate the plate with mercury before it is put into use. Only the ordinary quantity of quicksilver is then added to the mortar with the new plate. In none of the mills are the plates coated with amalgam before they are put to use, nor are there any silver-plated copper plates used in the district.

"The mercury-traps through which the pulp passes on leaving the apron-plates save the amalgam and quicksilver not collected on the apron-plates. There are additional traps at the termini of the sluice-plates outside. At the Homestake mills, until three years ago, the pulp flowed from the apron-plates directly to the sluice-plates into the wash-flume; then traps were introduced. How important this simple contrivance is can be seen from the fact that in the Homestake eighty-stamp mill there are recovered every month by the inside traps 80oz. of amalgam and 144oz. of quicksilver; by the outside traps, from 10oz. to 12oz. of amalgam, and 40oz. of quicksilver. These traps are emptied only once a month. If they were emptied twice a month, on clean-up days, a still better showing could perhaps be made. At the Caledonia the traps are emptied daily, when the apron-plates are being dressed. This is done because of the accumulation of concentrates.

"At the Homestake mill the inside trap consists of a wooden box, with copper-lined bottom 14in. long, 17in. wide, and 24in. deep. It contains three sliding wrought-iron plates parallel with its short sides. These are placed 2½in. apart, the centre one extending to the bottom of the box, the others 3in. above it. The pulp flows under the first, over the middle one, and again under the third. The outside trap is larger, the box being 48in. long, 14in. wide, and 48in. deep. It has three partitions, set 10½in. apart, reaching from the bottom of the box up to 1½in., 3in., and 4in. below the level of the inlet, the outlet being 6in. below this. In the middle, between the two wooden partitions, is let down a sliding wrought-iron plate, ¾in. thick, reaching to 3in. from the bottom of the box. The Caledonia traps are much smaller, since there is one for each apron-plate.

"The sluice-boxes receiving the pulp from the inside traps are simple wooden troughs, with copper-lined bottoms. At the Homestake they are from 8ft. to 10ft. long, 18in. broad, and have a fall of 1in. to the foot, the copper used for the bottom being ¾in. thick. At the Caledonia mill they are 8ft. long, and only 8in. wide, as less pulp passes through them. The main sluice into which they discharge is 2ft. square.

"*Daily collecting of Amalgam and dressing of Plates.*—The amalgam which has collected on the apron-plates during the previous twenty-four hours is removed every morning, when the day-shift begins. At the Homestake mills, the head amalgamator; at the Caledonia mills, the day amalgamator, each with an assistant, has charge of the operation. Every amalgamator has his own way of managing the details in this work, although the general outline is always the same. The method of the Golden Star mill will serve for illustration.

"When the plates are cleaned the water-supply of the one battery is shut off, the stamps are hung up, and the splash-board removed and washed at the head of the apron-plate with water through a hose. It is then placed at the lower end of the plate, and the hose is turned on to the screen and apron to remove all the sand collected there. The plate, if normal, is now clear and bright, except for occasional spots, so-called blisters, resulting from iron and copper salts. These are removed with a scraper—a blunt, double-edged chisel. Then the two men loosen the amalgam with heavy whisk-brushes, beginning at the top and working downwards. When this is done the amalgam is swept in the opposite direction and collected at the head of the apron. There it is brushed into the amalgam-scoop with a rubber scraper—a small, sharp-edged piece of belting—and emptied into a small iron receiver. After this the plates are brightened by brushing them with a whisk-broom, using tailings moistened with a dilute solution of potassium-cyanide, the men working from the head of the plate downward. If necessary a little quicksilver is sprinkled on the plate from a bottle, over the neck of which a piece of canvas is securely tied. After being brightened the plates are smoothed with soft paint-brushes passed transversely over them, beginning at the bottom. This finishes the operation, which requires four hours to twenty-four plates.

"The amalgam attained is contaminated with impurities. To remove these it is placed in a wedgewood mortar, and diluted with quicksilver. The amalgamator then adds water, and works the amalgam to bring all impurities to the surface. These are in part washed off with a hose, in part removed with a sponge or wet cloth—the base-metal amalgam—until the amalgam is perfectly bright. It is then passed through a small strainer, and the residual pasty amalgam is transferred to a piece of linen, where the excess of quicksilver is pressed out by wringing. The ball of hard amalgam obtained is locked up in a safe and kept until the next clean-up. All the sands are returned to the battery; the waters go to waste, and the quicksilver goes back to the main stock.

"*The Clean-up.*—Twice a month the gold amalgam adhering to the inner plates is removed, when the necessary repairs to the mill are also made. At the Caledonia mill the operations are the same at the 1st and 15th of every month, and similar to those of the 1st of the month at the Homestake mills. At the latter the clean-up in the middle of the month differs from that at the beginning. At the first of the month the entire mortar is emptied, and shoes and dies are changed if necessary, while on the 15th of the month it is intended to remove only the amalgam from the inside plates, and to clean up the mercury-traps.

"At the Golden Star mill the clean-up at the 1st of the month is carried on in the following way: It begins at 7 o'clock in the morning. The feeding of the battery is stopped a quarter of an hour beforehand. The stamps are made to drop slowly, so that at 7 o'clock no more ore may be found in the mortar above the screen-frame. The splash-boards are removed, the stamps hung up, the water shut off, and the engines stopped. The mortars on one side of the mill are then opened by removing the curtains, screens, and chuck-blocks. The curtains and screens are first roughly washed by playing a hose over them. They are put aside to be more carefully cleaned later on. The six chuck-blocks from the batteries facing the side of the mill which is being cleaned up