

amount crushed per day is not known, as there is no easy way of determining how much of the ore in the bins has passed through the crusher. If one-fourth of the ore—a probable proportion, in view of the slaty character of the ore—passes through the screens, escaping the breaker, and if twenty stamps crush 90 tons of Homestake ore in twenty-four hours, the amount crushed in twenty hours by one breaker is $67\frac{1}{2}$ tons, or 3·4 tons per hour. This small figure, as compared with the capacity of the crusher, which is given at 7 tons, is due to the smallness of the mouth of the crusher, which necessitates the breaking-up of the ore—a serious matter, occasioning much delay. No part of the mill-work is so laborious as this breaking and feeding of the ore, which has to be done by hand.

“The wear-and-tear of material in a crusher is comparatively small, a shoe lasting two months and a die four months. The small receiving-capacity of the No. 5 Blake is a marked disadvantage to it in comparison with the Gates crusher lately introduced at the Caledonia. The ore of the Caledonia Mine breaks rather coarse—that is, it does not show much of the slaty character of Homestake ore, and is dumped immediately into the mouth of the crusher without the use of the grizzly. With about the same horse-power as three No. 5 Blake’s, and set to the same size, one No. 6 Gates crusher, with three receiving-openings, each 12in. by 18in., attended by one man only, crushes 200 tons in ten hours. When three Blakes were in use it required five men to produce the same amount in twenty hours. Mr. T. L. Skinner, the superintendent, states that this new crusher saves him about £5 10s. a day. In order to make the iron head last longer, he uses three sets of concaves, of graduated thickness, the thinnest first, and so on. When, after some time, the head and first set of concaves have become so worn away as to increase the width of discharge above 1½in., the second set is introduced; and when they in turn wear, then the third. By the time these are worn down—about five months—it becomes necessary to replace the head. The disadvantage of the Gates crusher is its enormous weight—No. 6 weighs 30,000lb.—and the consequent difficulty of transporting it, especially in some mining regions. The best arrangement for a large mill seems to be to use a still larger Gates crusher—No. 8, with receiving-openings 18in. by 48in.—set to crush coarse, and discharging into No. 6 crushers, set to crush fine. Thus the largest pieces of rock that man could handle would pass directly into the crusher, and the breaking by hand in the mine and mill would be reduced to a minimum. The smaller Gates crusher, with correspondingly small mouths, are not to be preferred to the Blake crusher.

“*Ore-bins.*—These receive the ore from the grizzlies and crushers directly over them, and discharge it through chutes into the hoppers of the feeders. They are triangular, with one vertical side, facing the battery, and reaching down to the cam-floor. Just above the latter are the openings—one for each feeder—through which the ore passes downwards into the chutes, terminating in the hoppers of the feeders. The quantity discharged is regulated by a sliding door. In a double mill the inclined bottoms of the two bins diverge, leaving an open space between, which has the shape of an inverted V. This arrangement is common to all the mills except the Father de Smet.

“The bottoms of the bins, which are 3in. in thickness, are made of 1in. board running lengthwise, with 2in. plank placed at right angles upon it crosswise; the bottom and sides are carefully braced with strong beams. There are no separate compartments or special arrangements for directing the ore towards the discharge-openings. The descending ore soon wears out such contrivances. It is advisable to line the upper part of the bottom on which the ore drops from the grizzlies and crushers, otherwise it wears out much faster than in the middle and lower parts, which lasts from five to six years. It is best to make ore-bins as large as practicable, so that in case of accident in either the mine or to the rock-breaker the mill need not stop. The capacity ought never to be less than one day’s supply. By multiplying in each of the three double mills the horizontal distance between the two sets of batteries with the vertical distance between the crusher-floor and the cam-floor the comparative size of the ore-bins can be approximately estimated. The following table shows the result. It is assumed that the distance between front of bin and battery, as well as the incline of the bin, is about the same in all:—

Name of Mill.							Horizontal Distances in Feet.	Height in Feet.	Product in Square Feet.
Homestake	...	...	...	...	...	...	44·5	14·25	634
Golden Star	...	...	...	...	...	...	36·0	23·75	855
Highland	...	...	...	...	...	...	46·0	27·75	1,046

“This would show, that of these mills in which the batteries are arranged back to back, the Highland has the largest bin-capacity. In the Father de Smet, where the batteries discharge towards the centre, the bins built entirely above the batteries, and extending to the side walls of the building, have a still larger capacity, the figures corresponding to the dimensions given above being 57ft. by 30ft., or 1,710 square feet. There are, however, decisive objections on other grounds to this arrangement. The apron-plates are so overshadowed by the inclined bottoms of the ore-bins above, that the facility of supervision claimed as one advantage of this plan is largely neutralised by the prevailing darkness, even at noon-day.

“*Feeders.*—The working-capacity of a battery, and its exemption from unnecessary wear-and-tear, depend greatly on regular and equal feeding. This used to be done by hand, but is now generally accomplished by automatic feeders placed at the back of the batteries, and discharging either directly into the feed-opening of the mortar, or, as in the Caledonia, upon a small inclined iron-lined apron, which leads to the mortar. By the latter arrangement, a little more room is left between the feeder and the mortar, and the feed-opening can be narrower and longer, and the ore