discharge-end is from 7in. to 10in. lower than the feed-end. The cylinder is geared to make from three to six revolutions per minute, according to the diameter of the furnace, the angle of the incline, and the character of the process. The less the diameter the greater will be the speed. These furnaces are now arranged so that the speed can be increased or decreased at will, so as to vary the length of time that the ore requires to pass through. By decreasing the speed the ore is retained longer in the furnace, thus facilitating the working of baser ores. The Brückner cylinder ought to be geared so as to make one revolution in two and a half or three minutes if 5ft. in diameter, or one revolution in four minutes if of the larger size, 6ft. 6in. in diameter.

Capacity of the Different Furnaces.—The Howell, White, Stetefeldt, and the reverberatories with several hearths, or with a single very long one, are continuous furnaces; the Brückner and the reverberatory with a single short hearth finish a given charge before a second is introduced. The capacity of the ordinary-sized Howell and White furnaces is from ten to fifteen tons, although twenty tons are sometimes put through these furnaces in twenty-four hours, and at the Alexander Mill, in Nevada, when working on ore containing most of the silver as chloride, a capacity of fifty tons was reached. The 12ft. by 5ft. Brückner cylinder will hold about two tons of ordinary ore, the amount put through in twenty-four hours depending on the time needed to roast, which is very different for different ores. A Brückner will ordinarily work six tons a day. The Stetefeldt furnace can work from twenty to sixty tons, according to its size, in a day, and the reverberatory furnaces from 1,000lb. to 2,000lb. to the charge. The only O'Hara furnaces reported have a capacity of twenty tons each in twenty-four hours.

Methods of feeding Ore into Furnaces.—In the Howell and White furnaces the ore, mixed with salt in the battery or after crushing, falls from the elevator into a chute, which carries it into the upper ends of the furnaces. For the Brückner the ore and salt are crushed in the battery together and conveyed to the hopper above the furnace; or the salt, having been ground fine in a mill or crushed by a separate battery, is added after the charge is partially roasted. At the Custer Mill, in Idaho, the salt is pulverized separately, but is added with the charge of the ore. The same methods are used with the reverberatory furnaces. In the Stetefeldt the feed of the ore and salt is regulated by mechanical appliances, so that the supply of each entering the furnace can be adapted to the necessities of the ore.

Methods of conveying Ore to Furnace.—The usual way of carrying ore from the battery to the furnaces is by means of screw-conveyors and elevator-belts with sheet-iron cups attached. Sometimes cars are used for this purpose.

Manipulation in Roasting.—In the ordinary reverberatory the work to be done consists in raking and hoeing from the flue-end of the furnace to the fire-bridge and back and forth, so as to expose every particle first to the oxidizing influence of the air, and then to the chloridizing effect of the decomposing salt. The quality of the roasting depends almost entirely upon the care and diligence with which this manipulation is performed. After the roasting is completed the ore is raked from the furnace to the cooling-floor and there sprinkled with water, either immediately or after an interval. In the Stetefeldt, every three-quarters of an hour the door at the bottom of the shaft-stack is opened, and the ore which has collected at the bottom is drawn out upon the cooling-floor and sprinkled with water. In the Howell furnace the ore falls from the lower end of the cylinder into an iron box set in a chamber between the fire-box and the furnaces, and closed by iron doors. When the box is full the doors are opened, and it is swung by means of a crane out upon the cooling-floor and dumped. It is then replaced, and the doors closed. A simple brick oven may be substituted for this movable box. When the charge in the Brückner is completely roasted the furnace is stopped, and, the discharge-doors having been opened, it is again put in motion, and as the cylinder revolves the ore falls directly on the cooling-floor. It is almost completely discharged in ten revolutions, after which another charge is introduced. Whichever furnace is employed the product is, or should be, the same. The colour varies from a light reddish-yellow to a dark brown, its shade depending on the amount of oxide of iron. It should have a light, porous, and woolly appearance, and when taken out should show no sulphurets.

Temperature Maintained.—In the Brückner and the reverberatory furnaces, after the desulphurization of the ore, which requires from two to eight hours, the temperature is raised and the chloridation period begins, which lasts from two to four hours. In other furnaces, with one exception, a uniform temperature about a cherry-red is maintained at the fire-bridge, the ore being exposed to higher and higher temperatures as it passes through the furnace. In the original White furnace the ore is heated to the highest temperature at the point of entry.

Tenor of Ore to be Roasted.—Silver-ores which require roasting before they can be amalgamated are of very varied composition. There are some ores which contain so little sulphur that only an incomplete chloridation is obtained unless sulphur, either in the form of brimstone, iron-pyrites, or copperas, is added before the ore is introduced in the furnace, sulphur in some form being necessary for the decomposition of the salt and the liberation of the chlorine. There are other ores, on the contrary, which contain so much sulphur in the form of sulphides that a long oxidizing roasting is necessary before the ore can be prepared for chloridation. The typical roasting-ore is quartz containing silver-minerals and from 10 to 15 per cent. of iron-pyrites, with a slight admixture of copper-sulphides. Calc-spar, braun-spar, and fluor-spar, if present in any quantity in the ore, retard the chloridation, as they absorb a large part of the sulphuric acid. Arsenic and antimony minerals increase the loss of silver by volatilization. Zinc-blende requires a longer oxidizing roasting to convert it into sulphate, and then a high temperature must be maintained before it will decompose the salt. When there is a large amount of zinc in the ore the chloridation is an imperfective one. Lead and copper contaminate the amalgam and the bullion. All these minerals involve the use of a large percentage of salt in roasting, but if present in only small quantities they do not perceptibly affect the chloridation. In mixing ores the sulphur and the silver contents of the charge are kept at those percentages which have been determined in actual practice to be the most favourable under the circumstances to the chloridation of the silver. The effort made to attain