

heat shall enter into the kiln near the bottom and pass upward through the stone, previously broken into small chunks, the top of the kiln being left open for the escape of the smoke and gas and to create a draft. The degree of heat required is not specific, but the more intense the heat the quicker the process of driving out the acid is completed, and it is chiefly in the matter of a better application of the heat generated in the furnaces that improvements have been made in the process. The primitive form of kiln, that most generally in use by those operating on a small scale, is known as a "pot kiln." This consists of a well of masonry built up a few feet from the ground, with an opening on one side along the ground for a fire box. The limestone is piled up inside the kiln, a small space being left in the center, at the bottom, connecting with the fire opening. A fire is maintained in the opening at the bottom, the heat passing up through the stone and gradually heating the whole mass. When the acid has all been expelled the fire is extinguished and the lime is taken out with long-handled shovels through the ground opening. This process is very slow and burns but a small quantity at a time. A decided improvement upon this is the stone kiln in general use until late years where lime was burned on a larger scale than by those using pot kilns. In this there is a radical change in principle, as the kiln is so arranged that the fire is never drawn, except to repair the kilns, and the lime is drawn off gradually from the bottom as fast as calcined, an equal quantity of rock being fed into it from the top at the same time. There are four furnaces, two each on opposite sides of the kiln, entering it about four feet above the bottom. In drawing lime, all that occupying the space between the fire and the bottom is taken out through an opening in the bottom. The kiln consists of a wall of masonry about twenty feet high and eighteen square, supported outside by heavy cross timbers and having a cylindrical space in the center five feet in diameter. Above this is a wooden crib the full size of the kiln, into which the stone is dumped, making the kiln self-feeding as the lime is drawn away. Improvements in this latter method have been made which give a total product nearly fifty per cent. greater, the peculiarities of which will appear in the description of the works of the Tacoma & Roche Harbor Lime Co., the largest enterprise of its kind in the west.

When, about thirty years ago, the dispute about the possession of the San Juan islands, lying between Fuca straits and the Gulf of Georgia, resulted in a temporary joint occupation, the government inquired into the resources of the islands and found them to possess the only extensive ledges of limestone known to exist in the entire northwest and by far the most

valuable on the Pacific coast. The largest and purest of these is the one at Roche harbor, on the extreme northwestern corner of San Juan island, the largest in the group, and from this ledge the English soldiers, who garrisoned the post not far away, made considerable lime. They used a pot kiln, such as has been described, and the lime produced, amounting to about fifty barrels in two weeks, the length of time it took to lay, burn and draw a kiln, was used at the barracks and by the numerous war and merchant vessels that entered the harbor, and much was sent to England in casks that had contained meat and liquors. After it was decided that the islands belonged to the United States, the ledge was homesteaded by a man named Ruff, but no work was done on it till 1882, when two brothers named Scurr and three named Ross bought it and began the manufacture of lime in a stone draw kiln, such as the one last described, operating as the Roche Harbor Lime Company, though not incorporated. Meanwhile lime was being made at other points on the islands in a small way, and San Juan lime acquired a great reputation in the markets of the northwest. Lime was also being made in the Puyallup valley by the Tacoma Lime Company. In 1887 the Tacoma & Roche Harbor Lime Company was organized, and the plants of both "The Tacoma Lime Company" and "The Roche Harbor Lime Company" were purchased. The energy of the new company was concentrated at Roche harbor, where already a great amount of money has been invested in creating an immense industry, which in its present stage of development is valued at \$1,000,000.00. The ledge is a solid mass of marble, extending across the neck of a peninsula formed by Roche harbor and Westcott bay, a distance of half a mile, having a width of eight hundred and fifty feet and a height above the water of three hundred and fifty feet, the average height being fully two hundred and fifty feet. How far it extends below the water in any direction is not known, nor is information on that point very eagerly sought, as there is enough stone above the water to last for ages. Just think of it! Enough to make a monumental shaft for every man, woman and child in the United States. Here are half a billion cubic feet of the purest gray marble, or seventy billion pounds, capable of making three hundred and fifty million barrels of lime, enough, at one thousand barrels per day, to last one thousand years. No wonder they do not worry much about how far the ledge extends under the water. In quality, the stone is superior to any other yet found in the United States. Numerous assays of it have been made by various persons and for varying purposes, the samples being taken from widely different portions of the ledge, and the results have all given as high as ninety-