

Cliff lode. Not far away, at the east end of the pass, are immense beds of red hematite ores of equal purity, suitable for mixing with the magnetic iron, to increase the value of the product. A favorable circumstance attending is the existence of coal in great quantity close at hand, and it is said that limestone is also found near by.

In Cle-el-um mining district, W. T., a great lode of magnetic iron is said to penetrate throughout, with deposits of silver, copper and nickel ores attending. This lode, as well as numerous others found in Eastern Washington and Eastern Oregon, have received no especial attention, and doubtless will not be for many years to come of any particular value. The same is true of the iron ores of Idaho and Montana, which have not thus far been utilized, except in very small amounts as a flux in lead smelting. It is worth mentioning that at a point fifty miles south of Caldwell, Idaho, and near South mountain, is the Narragansett iron mine, which consists of a body of magnetic and specular ores so large that two acres of surface dirt stripped away have not revealed any limit to the bed. Near by, a fifteen-foot lode of hematite exists, which is said to carry thirty dollars per ton in gold; but this is, no doubt, an exaggeration and scarcely allowable unless the mine is for sale.

In British Columbia are a great many surface indications of iron, but very little attention has been paid to them. The most important find yet made is on Texada island, in the Gulf of Georgia, about one hundred miles north of Victoria. There are enormous masses of coarsely granular magnetic ore which are traceable for miles and are finely situated for mining and shipping, being close to deep water. The ore carries, by analysis, sixty-eight per cent. of metallic iron, with very little phosphorus, but so much sulphur as to require roasting before smelting. The location is within twenty miles of the extensive Comox coal fields, on the shore of Vancouver island. Limestone is plentiful in the immediate vicinity. It is under such favorable conditions that great iron manufacturing enterprises are certain to grow up, and it is highly probable that the next, or even the present, generation will see these rich deposits utilized, and an industry of unparalleled magnitude take its rise. The first ore mined at Texada was in 1879, when it was sent to London for smelting, the shipments that year amounting to two hundred dollars, but increasing considerably in later years.

Puget sound has already become the seat of iron manufacturing, for at Irondale, five miles below Fort Townsend, exists a smelting plant of some importance, which has made during a series of years the initial efforts to firmly establish the industry upon these shores. Beginning work in the seventies, a blast furnace with a capacity for smelting ten tons daily was first set up and run on mixed ores, receiving hematite from Chinacum and magnetic from Texada. A schooner plying to the mines brought the minerals cheaply, and calling at San Juan island took thence limestone for flux. The fuel was charcoal, burned in the neighboring forests, as many as two hundred and fifty men—half the whole dispos-

able force of laborers attached to the works—being employed in chopping wood and attending the kilns. In 1882 and 1883 the business made such a satisfactory showing that great additions were made. A wharf two hundred yards long was built and the furnace was replaced by one of fifty tons capacity, with elevators and all the usual accessories of a first-class establishment. Twenty tons of iron were turned out daily during a part of 1883, and the business seemed assured, but owing to the universal depression, a partial cessation of operations has occurred.

The principal iron ore deposits in Oregon lie along the west side of the Willamette, reaching from near the falls of that river to a point opposite Kalama, on the Columbia, being developed most strongly in Columbia county, and in geographical extent are hardly equaled elsewhere in the world. The ores are bog iron and to a great extent lie in depressions upon the upper surface of lava beds, being covered for the most part with a thin layer of soil washed there by running water. Iron ore occurring in this manner in cavities in basalt is not unknown in other localities, though not elsewhere found in such prodigious quantity. The deposits are varied in quality as well as quantity. Certain layers found near Oswego gave, upon analysis, fifty-five per cent. of metallic iron, while in other localities near by the best lots only yielded ten per cent. The ores worked in 1866, on the starting of the blast furnace at Oswego is described as a brown hematite, containing from forty-six to fifty-six per cent. of metallic iron. In 1876 the ore used had but ten per cent. A Mr. Olds first drew attention to these deposits by erecting, in 1862, a miniature reduction furnace two miles from the mouth of the Tuaitin, wherein he smelted some iron, getting a product that was pronounced very fair. This was the first iron reduced from ore on the Pacific coast of North America. During the subsequent years the industry has been kept up not far from where the embryo works stood, and what is satisfactory to add, with as constant progress as the times would admit of. In May, 1865, a company was incorporated, with a capital of \$500,000.00, to work the mines, with W. S. Ladd as president, and twenty Portlanders owning the most of the stock; within a year works were erected at Oswego, a hot blast furnace of ten tons daily capacity included. The institution was a wonder to Oregonians, few of whom had ever seen the like. In 1875, the daily product being ten tons, the expenses of producing one ton were proportioned as follows: ore delivered at the furnace, \$10.75; charcoal, one hundred and fifty bushels, at nine cents per bushel, \$12.50; wages, \$4.00; limestone, brought from San Juan, Puget sound, five hundred pounds, \$5.00; total cost of one ton of iron, \$33.25. The metal sold in San Francisco for \$46.00 per ton, and has ever since been in demand in limited quantities for those special purposes where charcoal pig is considered indispensable. The Central Pacific Railroad Co. tested it and found it well adapted to car wheels, etc., but it never could compete for ordinary purposes with Scotch and English pig.