crane inside the semi-circular trench, and then the castings themselves are lifted out and rolled outside for cooling, and trimming, if there be any small imperfections that can easily be polished off. Then the pipes are tested by being subjected to hydraulic pressure, varying between 300 and 500 pounds, according to the specifications of the contract which is being filled. If the pipes are perfect they are dipped in tar, and when dry are ready for market. But very few of the castings are condemned, though any imperfection in the iron or inequality in thickness sends the pipe back to be broken up and put through the cupola again. In the efficiency of the plant and the general excellence of the product this institution is not excelled by any establishment in the country.

The cores about which the metal is run are made in the building. The center is a gas pipe, with numerous holes in it, so it acts as a flue through which gases generated by the combustion of the hay rope with which it is wound escape. In an adjoining building are machines employed in twisting rope which is wound around the center of the core before the coating of clay is put on. That earthy mixture is ground by heavy machinery and is about the same as that prepared for ordinary bricks. For the ends and certain other portions flour is mixed with it to give it cohesiveness. As the core is made it is turned in a sort of lathe, so the surface becomes perfectly even and of the requisite size for the inside of the pipe to be cast around it. The hay rope next the iron center of the core burns out from the heat of the metal. The center is thus relieved of pressure, so it can be easily withdrawn and the clayey coat of the core crumbles and falls out when the pipe is drawn from the flask. All the lifting and shifting work is done by the huge steam crane, which is a model machine, capable of handling ten tons at a lift.

From the cupola the metal for casting is drawn off into a large vessel called the ladle, about the shape of a large iron kettle. The metal is often too hot for casting safely when drawn, and then it is stirred until it becomes sufficiently cool, when the crane lifts and carries the ladle to the proper moulds and the molten metal is poured in. One ladleful is sufficient for several pipes of medium size. Of course, the ladle is too hot to handle with the hands, so it is tipped by means of a screw that holds it in any position desired. At intervals during the casting the cinder is drawn from the cupola, and when the day's work is done the bottom is dropped and cleaned preparatory to receiving the charge for the next day's casting. The lime escaping with the cinder is blown into fine, glass-like threads, that float in the air and collect on adjacent projections in a woolly body, somewhat resembling dandelion spikes. This is known as mineral wool, and it has a market value, but the demand is so light that it does not pay to save it.

The industry thus briefly sketched is the largest manufacturing plant in Oregon. The company owns a large tract of mineral and timber land about Oswego, and has a practically inexhaustible ore supply. This ore yields between thirty and forty per cent. of metallic iron. The limestone used for flux is brought from Baker county in Eastern Oregon, and the coke from Puget sound. The charcoal consumed in the furnace is burned at the company's kilns a few rods away. There are forty-two of these kilns, which are of the bee hive pattern. Each kiln produces about 5,000 bushels of coal per month, that being the amount yielded by two fillings of fifty cords each of fir wood.

The present plant of the Oregon Iron & Steel Company was newly constructed and placed in operation almost exactly a year ago. Away back in the 60's a mine was opened and reduction works built and operated for a few years, the first iron produced west of the Rocky mountains being turned out there. The

CHARCOAL KILNS.