

## Our Industries.

No. X.—The New Zealand Portland Cement Co., Limited.

PORTLAND cement is the basis for concrete as the moderns know it. And in that case, once again, the necessity of an ingenious engineer was the mother of invention. One hundred and fifty years ago an English engineer, John Smeaton, in attempting to construct a lighthouse upon Eddystone Rocks, found the need of a cementing material which would harden under water, and which would also develop an ultimate strength greater than that of ordinary lime. Through a course of experiments, he discovered that an impure, soft, clayey limestone, when burned, possessed the property of "setting"—becoming hard—under water. This was the beginning of hydraulic lime; and out of it grew the invention of true Portland cement, which is the finely pulverised product obtained after burning to the point of incipient fusion an intimate and properly proportioned mixture of calcareous and argillaceous materials—in other words, limestone or marl, and clay. In addition to Portland cement, there are also slag or puzzolana, and natural, or Rosendale, cements. Portland cement—so called from its resemblance to the stone found on the island of Portland, on the coast of England—on account of its higher and more uniform quality, is the material usually considered in speaking of concrete. Fifteen years ago concrete was used principally for foundations and sidewalks. It is estimated that during these fifteen years enough concrete walks have been laid to girdle the earth a dozen times.

With the changing conditions of building construction, however, Portland cement has become what has been termed the "liquid stone" of the present day, and we in New Zealand are as much concerned with its use in fire and earthquake proof structures as the people on the other side of the world. Consequently, it is not surprising to find that the manufacture of Portland cement ranks amongst our most important industries.

The rise and progress of the New Zealand Portland Cement Co. affords an interesting example of the expansion and possibilities of the cement industry in New Zealand, combined with a ready appreciation of local advantages and sound methods of dealing with the same.

Starting business some years ago the Company had scarcely a twelvemonth to introduce their cement on a market then dominated by the imported Portland cement, ere a disastrous fire practically swept the works out of existence. These works, situated on an island in the Whangarei harbour, called Limestone island, built at the water's edge, were in a unique position for such an industry. The island consists of about 103 acres of solid limestone, the quality of which is unsurpassed for the production of Portland cement. This fire, although a great blow to the rising concern, was really a blessing in disguise, for starting as the Company had, by taking over a concern which for a few years previously had been run on a small scale with inadequate machinery, the fire necessitated the installation of a complete modern plant, which was carried out with great rapidity. The benefit of this became at once apparent, for the improved article turned out at once commenced to attract attention from engineers and others concerned in building work of all descriptions, with the result that their appreciation of the local article caused a steady but rising demand to set in, which, after four years, has become so great that, after being taxed to the utmost capacity, it was determined about twelve months ago to double the plant. In carrying this out advantage has been taken of the latest developments in cement machinery, and when the installation is complete—which will be by the beginning of January, 1907—the works will be the largest and most up-to-date in New Zealand. The increase and development of the Company will

be more readily seen when it is mentioned that the output, 1000 tons per month, which has been found to be inadequate, will be increased to about 2500 tons. This satisfactory position, apart from the high quality of the cement turned out—which has gradually broken down the prejudice against the article—has been obtained from the advantage of position, etc. Every part of the works has been planned to ensure a minimum of labour in production. The quarry is at the back of the mill, the stone is run in, treated, and sent out as finished Portland cement on to the wharf, at which steamers of 3000 tons have been berthed.

As showing the expansion of the Company, it has been found necessary to carry the wharf further



NEW ZEALAND PORTLAND CEMENT CO. : VIEW SHOWING QUARRY BEING EXCAVATED TO MAKE ROOM FOR NEW BUILDINGS.

out to accommodate vessels of 6000 tons. This is now being done in ferro-concrete by the Ferro-Concrete Company. The coal is obtained from the local mines and brought to the works by the Company's own lighters, and the time appears not very far distant when it will become necessary for the Company to run its own steamers.

The Portland cement manufactured by the Company is now well known as the "Crown" brand, and is in great demand for works of all descriptions. The Waihi Gold Mining Co. has, during the last three or four years, used upwards of 3000 tons, the Napier Harbour Board, about 2000 tons, while the Wellington Harbour Board have used immense quantities in the new sea wall. The Ferro-Concrete Company are using large quantities in their contracts with the Auckland Harbour Board, and also at Tonga, where they are putting up a ferro-concrete wharf. In addition to these companies, the Makatote viaduct, the most important structure on the Main Trunk Railway is, we are informed, using up "Crown" brand solely for the concrete work—about 1000 tons being required for this purpose. The contracts for the Public Works Department for both Auckland and Wellington are held by the N.Z. Portland Cement Company, and, in addition, the Company has just secured the contract for the supply of nearly 4000 tons for the Karori dam con-

struction, Wellington. From this, which does not exhaust the contracts held, it will be seen that the extension of the works was taken in hand none too soon, and it speaks well for the management that, although working under great stress, the large demands are being met, while the dismantlement necessary to the enlargement is being carried on at the same time.

A great future is assured for this Company which, while being a credit to New Zealand, is most certainly a valuable asset to the town of Whangarei, which benefits greatly by the large amount of trade caused by having such a thriving industry in its midst.

### America's Highest Viaduct.

The Pecos viaduct is the highest in North America. If one dropped a stone from the centre of the bridge to the water beneath, it would fall 321 feet. The bridge crosses the Pecos river in Texas; and, besides being of great height, is 2,180 feet in length. So far as known, there are but two railroad viaducts in the world which are higher. One is the new bridge over the Zambesi river at Victoria Falls in South Africa, about 420 feet high, and the other the Loa viaduct in South America, which has a height of 336 feet.

### Coal Consumption.

In the course of his address to the Glasgow University Engineering Society the president (Mr. G. T. Beilby) stated that there are, in Great Britain, steam engines and boilers with a yearly output of at least 5,000,000 h.p. The coal consumed by these is not less than 5 lbs. per 1 h.p. hour. By the use of gas engine and steam turbine that coal consumption might be reduced to 1½ lb. per 1 h.p. hour. The saving in coal, therefore, would be equal to about 28,000,000 tons, value at £9,800,000. The cost of making this change need not exceed £50,000,000, or, if the power is to be delivered in the form of electrical energy, £60,000,000.

The assertion that the rare earth metals of the incandescent gas mantle emit sparks on being scratched with a file has been investigated by Baron von Weisbach. He finds that the sparks are produced only when the rare metals are alloyed with 30 per cent. of iron, and he proposes to apply this property of the alloy to the automatic lighting of gas. As the gas is turned on, a file gently rubs the alloy, producing a brilliant shower of sparks, which immediately ignites the gas.

According to the report of the Inspector of Explosives, a workman was fined £2 last year for having pockets in his clothing when working in a danger building.