

“Rock Handling and Crushing at the Edison Cement Plant”

(in Warren County, New Jersey)

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The article begins:

“Of manufacturing plants erected in this country few have called out more comment than the factory erected by the Edison Portland Cement Company in Warren County, New Jersey, in the vicinity of New Village and Stewartsville. The entire plant is the creation of Thomas A. Edison, one of the greatest of the world’s inventors...The finished plant was to be one of the largest in the world, so potent is Mr. Edison’s name that there were not lacking positive predictions that the factory would completely revolutionize the making of Portland cement...The plant has been in operation for some months, however, but it is reported that the production has not exceeded about 1,000 barrels a day...At the present time the factory is shut down, owing to the dullness of the cement market...”

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ROCK HANDLING AND CRUSHING AT THE EDISON CEMENT PLANT.



Of manufacturing plants erected in this country few have called out more comment than the factory erected by the Edison Portland Cement Company in Warren County, New Jersey, in the vicinity of New Village and Stewartsville. The entire plant is the creation of Thomas A. Edison, one of the greatest of the world's inventors. Mr. Edison spent a great deal of his time perfecting the plans, his idea being to eliminate manual labor as much as possible, and to have the greater part of the work done by electrical power. Every appliance that it was proposed to install was first made in miniature, and the operations of the model were carefully watched, and improvements were perfected as soon as they were suggested. The finished plant was to be one of the largest in the world, and so potent is Mr. Edison's name that there were not lacking positive predictions that the factory would completely revolutionize the making of Portland cement. It was claimed that the output would cost less per pound than that from any other factory in existence. But common experience proves that mechanical ingenuity and perfection and practical operation are two very different things. It is conceded that the Edison plant is an admirable one on paper, but as yet it has exerted no appreciable effect on the cement industry. There were the usual delays in beginning operations, the promised opening of the plant having been postponed from time to time. Then came a disastrous accident by which several were killed. This was caused by an explosion of coal dust, and its effect was to set back the entire work. The plant has been in operation for some months, however, but it is reported that the production has not exceeded about 1,000 barrels a day. This is only equal to the production of many small plants in various parts of the country. At the present time the factory is shut down, owing to the dulness of the cement market.

The cement is made from a carbonate of lime rock and a dolomite, the quarry face being about 200 yards long and 50 feet high. An interesting account of the operation of the quarry and the equipment of the entire plant is given in "The Electrical World," from which quotation may be made.

The rock is first drilled and blasted, and then picked up by a ninety-ton Vulcan steam shovel and loaded upon skips, a standard gauge railway running into the heading in each cut, says the writer. These ninety-ton steam shovels are the most powerful of their kind ever constructed. Huge boulders, weighing upward of five to six tons, are easily picked up and deposited upon the skips. After each skip is loaded, it is hauled by a horse to a siding, where a train of flat cars is made up, and the rock is then hauled from the quarry, a distance of nearly a mile, to a shed located about 100 yards from the crusher. It is here that the actual process of cement-making begins.

Aside from the roasters, which provide the spectacular element of the plant, the crushers are, of course, the most interesting from a popular and

technical point of view. After the locomotive has hauled its train of flat cars to the shed, the train is broken up into sections of three cars apiece. There is a slight decline from the carshed for about 500 feet, where the bottom of an incline reaching into the crusher-house is met. The three cars travel by gravity along the tracks and partly up the incline, where they butt into a "dolly" car, which is provided with an automatic coupler. By means of this car the three flats are then hauled up the incline to the top of the rock-crushing house.

In this rock-crushing house are situated the giant crushing rolls, and beneath these the smaller rolls for crushing the broken rock. At the top of the rock-crushing house is a very interesting application of the motor drive.

It might be well at this point to explain that the skips are laid loosely upon the flat cars, and are of the form of an exaggerated dustpan. At the back of each is a heavy bolt. A large hook on the end of a flat steel belt automatically engages with this ring bolt and drags the skip from off the flat into adjustment at the edge of the hopper just above the giant rolls. These giant rolls are each five feet in diameter by five feet long, and the moving parts weigh, approximately, twenty-five tons each. They are capable of crushing any size of stone weighing five tons or less. The two rolls rotate in opposite directions, and are made up of chilled iron plates fitted on to a mandrel.

The motor which operates the skip dump—as the hook apparatus is termed—is inclosed in a gunny chamber, which is absolutely dustproof. This is a chamber which is made up of a skeleton framework, and the housing of which is composed of gunny cloth. It is a feature of all of the electric motors used in the Edison works that they are inclosed entirely in these dustproof gunny chambers, and all of the gears are also inclosed in gear cases to prevent their being interfered with by the dust, which is prevalent in all parts of the mill.

Immediately in front of the hopper, and directly under the edge of the skip as it is placed in position for dumping, is a feed roll operated by an inclosed electric motor, and which throws the rock directly between the crushing faces of the giant rolls. This feed roll, together with the skip dump and the drum for hoisting the three cars up the incline to the rock-crushing house, is controlled from a platform to one side of the main hopper. On this platform are the two controllers. The cable drum which winds the cable for pulling up the cars to the crusher is operated by a 500-volt, 110-horse power, General Electric motor. This is equipped with a solenoid brake for lowering the cars, and the resistance is disposed along the roof of the building. The three cars which are brought up at each time contain about fifteen tons, and a trip is made once every four minutes, the crusher taking care of the stone as fast as it can be brought up.

After the rock has been deposited in the hopper and passed through the giant rolls it drops to a smaller hopper with a capacity of ten tons, and is fed out over a roller feed to the first set of 36-inch rolls on the floor below. Then it passes by gravity through a second and third set of 36-inch rolls. These 36-inch rolls are 36 inches in diameter and 36 inches long, with a crushing

face of 28 inches. The first 36-inch rolls have flywheels to enable them to crush the large pieces passed by the giant rolls. Both the first and second rolls are set rigidly at a fixed distance between the crushing faces, but the third set of 36-inch rolls is held together by a set of coiled springs. This latter set of rolls also receives the spalls from the rock-drying house, which matter will be taken up in detail a little further on.

After passing through the first set of 36-inch rolls, the rock has been broken up into cubes of about three inches cross-section. Passing through the second set, it is broken into pieces of about one-half this dimension, and on passing through the third it comes down to about one-half inch in cross-section and finer. From the third set of 36-inch rolls the broken rock passes on to conveyor belt to the rock-drying house.

The crushing rolls in the rock-crushing house are driven from the engine-room on the first floor by a 500-horse power E. P. Allis vertical cross-compound condensing engine. This runs at 100 revolutions per minute, and drives directly on a jack-shaft. On this shaft is one pulley with a seven-foot face, upon which are three belts driving the three sets of 36-inch rolls. On the same shaft another pulley drives the giant rolls. Three generators are also driven from a pulley on the same shaft.

So much we quote from "The Electrical Review." There follows an interesting account of the drying of the rock, of its conveyance to the rock stockhouse, of its mixing and conveyance to the roasters, and of the final processes of converting it into cement. There are many novel features in all of this work in the method of adapting electrical power, but this is outside of the range of the present article. This magazine has frequently made the point that the leading field for the institution of economics in the stone industry is in the matter of handling, and consequently it is interesting to see what a genius like Edison accomplishes when he gives his mind to the problem.
