IRON FROM THE SAND DUNES

DEPOSITED BY THE SEA IN LAYERS ON THE GREAT SOUTH BEACH.

Fine Particles Separated from the Sand and Attracted by Cylindrical Magnets—Pots of Ground Ore Deposited in Layers Along the Beach—An Entirely New Enterprise.

In a sluiceway between two sand dunes on the Great South Beach opposite Speonk, Long Island, stands a large rough-board building, with a two-story, red-painted extension, from one end of which rises a smoke stack. Nearly are two smaller buildings. They are about midway between the line of the surf and the south shore of a creek that extends from the Great South Bay through the meadow land. There the experiment of extracting iron from the sands has been carried on for several months. Although it was an experiment at first, it is asserted that the result has been so satisfactory that other buildings, similar in structure, and provided with machinery capable of doing more work, are to be erected along the beach. The machinery was made and invented particularly for the work, and the power employed is magnetism. The product is fine particles of almost pure iron. At first the experiment was laughed at. The idea that machinery could be placed within seventy-five or a hundred feet of the surf that sometimes surged through the sluice way, and that iron could be taken from the wastes of sand, was ridiculed. But the visitor has only to imagine that the ocean has retreated from the shore, leaving a mountain topped with sand, and the mining seems more probable.

The incident that led to the first attempt to extract the iron was purely accidental. The iron has been confined in the sands for probably thousands of years, and the beach has been trod by thousands of persons, yet nobody apparently realized that the tons of the purest iron resting there could be taken out.

One day last year Mr. E. R. Haines, an English mining and civil engineer, was in the office of Maclay & Davies, the architects of the Long Branch iron pier and the Coney Island piers, and while talking to Mr. Maclay carelessly put a hand in a side pocket of his coat, and, taking it out, began sifting a handful of black sand through his fingers.

"I'll bet I know where that came from," Mr. Maclay remarked, breaking off the other conversation.

"No, you don't," Mr. Haines said, decidedly.

"That came from the shore of Long Island," Mr. Maclay said with equal decision.

"No, it didn't," Mr. Haines said, smiling. "That came from New Zealand."

"Well," Mr. Maclay said, "there's some just like it on the great South Beach, near Quogue."

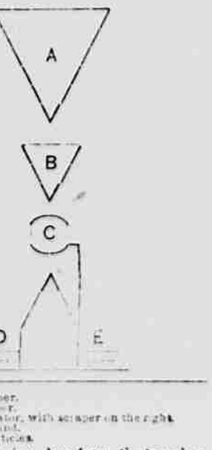
"Then we'll better jump into a train," Mr. Haines said, "and go and see it."

And so they did.

Mr Maclay had spent several vacations on the south side of Long Island, and had noticed the patches of reddish sand along the Great South Beach, and especially the streaks that were visible when children dug miniature ditches through the white top layer. He and Mr. Haines went to West Hampton, and, crossing to the beach, drove along it for miles. Wherever the patches were largest they stopped and thrust a common horseshoe magnet into the sand. It came out with hundreds of particles of iron clinging to it. Holes were dug, and layers of the ore, varying from two inches to a foot in thickness, were found. Then Mr. Haines demonstrated the similarity of the deposits to the black sand that came from New Zealand, and told how the English company had extracted iron of the best quality from the black sand. He was firm in his belief that it would pay to mine the ore on the beach. Mr. Maclay interested Henry Havemeyer, the sugar refiner, in the enterprise, and the necessary capital for getting the machinery was supplied. Mr. Haines had been in the iron and coal mining business for fifteen years, and had seen the works of the English mining company in West Bromwich, South Staffordshire. There the ore was run through sluices, and the iron separated from the silicate by its specific gravity. He thought the magnets could do the work better with the Long Island sands. From January last until May he experimented upon the necessary machinery. At length he had two magnetic separators made by Zucher & Levett under Miller's patents.

In May the material was taken to the beach and the main building, with an extension, was erected. The main building is sixty by forty feet and the extension forty-six by twenty feet. Near by is a drying platform seventy-five by thirty feet. Inclined planes extend from the beach level to the platform, and from the platform through the main building to the second story of the extension. To the east of the main building are a stable and a movable car, wherein are the quarters of the miners, who are now mostly Italians. In one end of the extension is a Baxter engine of four horse power. It runs a dynamo-electric machine of a power equal to seventy-five Bunsen cells and the gearing of the magnetic separators, which are in adjoining rooms. In the main building are two large drying furnaces, which are used when the ore cannot be dried in the platform sunshine. The first load of ore was watched with anxiety when it was dumped into the hopper, but the product was a pile of iron, with a small percentage of sand and another pile of waste. Gradually the percentage of sand was reduced, and since the work was begun about 400 tons of iron have been sent away. The work was not continued daily from the start. Men from the neighboring villages could not be employed as miners, and at the beginning only a few men were taken from the city to the beach. The Italians had to be taught how to throw out the richest ore without sending it to the sand, and there were other causes why the work proceeded slowly.

The machines are very simple. Very little room is required, and two more separators could be put with the others in the present buildings. The following diagram, which also represents a vertical section of the separator, will assist in understanding the process:



A—Revolving hopper.
B—Spreading hopper.
C—Magnetic separator, with scraper on the right.
D—Pile of waste sand.
E—Pile of iron particles.

The ore, after being dug from the trenches, is spread and dried on the platform or in the furnaces, then screened and dumped into the receiving hopper. The mouth of the hopper has two brass lips that are regulated by screws, so that the ore can fall in a thin line into the spreading hopper, which also has lips at its mouth. From the spreading hopper the ore falls in another thin line, striking the separator a few inches from the top. The separator is an iron cylinder 8 inches in diameter and 24 inches in length. The cylinder, being highly magnetized by the electricity furnished by the dynamo machine, attracts the particles of iron and carries them to a scraper, where they fall to the floor, the waste sand having fallen on the other side of a partition.

On each end of the cylinder is a coil of copper wire about ten inches in diameter and six inches in width. The electricity generated by the dynamo is communicated by a wire from each pole to each of the coils, and the cylinder being between them completes the circuit and forms the soft iron into a powerful magnet. The principle is almost the same as that of the patent boiler for middlings or ground grain, which has a long trough with a gauze-sieve bottom, a hopper at one end, and polished, hard rollers. As the rollers are turning a cross shaft in the rollers are turned, the middlings run through the hopper and along the trough and pass under the rollers. Electricity is generated by sleep's wool rubbers, and the rollers taunt the chaff to fly up and cling to them until brushed off into troughs parallel and close to the rollers, while the pure flour is pulled into receivers. It is said that the inventor got the idea from noticing the fine ashes of his tobacco pipe fly up to a rubber pencil that he was using as a rammer.

"Give us a little steam," Mr. Haines said to the engineer, "and we'll show how it works."

The engineer started the machine, and a belt running to the dynamo machine started it whirling rapidly, the electricity darting in tiny blue streaks from the axle to the brushes, so called, that rubbed it. Another belt running to one of the magnetic separators set it turning "some." Mr. Haines opened a valve and let the ore from the dynamo to the upper hopper. A few shovels were ready to work for an hour, when the machine was stopped, the screws were adjusted, the spreading hopper filled and the ore fed in slowly. Presently the ore began to come out in a stream of iron and waste. Mr. Haines said that it was a little too much of a good thing, and the ore was fed more slowly. Then the waste sand was shoveled into the hopper, and the ore was run through the machine alone. The waste came out in a stream, and the iron came out in a little stream. The iron was fed in with the waste, and the two came out in separate streams. The ore was then run through the machine with the waste, and the iron came out by itself. The ore was then run through the machine with the waste, and the iron came out by itself. The ore was then run through the machine with the waste, and the iron came out by itself