It Took The Mesabi Discovery To Beat Edison's Taconite Venture

THOMAS Alva Edison, the Wizard of Menlo Park, wagered \$1.5 million on an idea that didn't pay off but that might have if he had lived long enough. Edison believed that low grade magnetic iron ores could be utilized, and during the late 1880's and 1890's put up three quarters of what eventually amounted to a \$2 million investment in his magnetic separator and Ogden mine in northern New Jersey.

While Edison wasn't the only inventor to try magnetic separation, his activities at Llewellyn Park, N. J., and at Ogden were singular. Several innovations that were later to become standard mining practice were born at Ogden.

When Edison decided to launch the magnetic ore project, the existence of suitable deposits was not too well known. Because they were considered economically worthless, magnetic iron ore deposits were not recorded. Edison had designed a dipping needle. With needle in hand his men crossed and recrossed the country between the St. Lawrence and the Potomac. When a body of magnetic ore was discovered the ground was retraversed at intervals of 100 ft.

Edison and his associates acquired by purchase or lease some 16,000 acres. The Ogden property was one of the largest of the ore bearing areas. The extent of the orebody was developed by trenching every 100 ft across the strike of the deposit and taking samples at regular, short intervals. Tests indicated that ore averaged about 20 pct iron.

Edison departed radically from traditional crushing methods. Instead of screening after every crushing operation, material passed through a series of machines without any attempt at sizing until actual separation began. Edison quarried, mined, and re-crushed the ore to what was then considered fine size, then separated magnetic iron from nonmagnetic gangue, mixed the concentrate with a binder, pressed the product into briquettes, dried it in a furnace, and loaded into cars for less than 6¢ per unit of the iron content of the briquettes. E. Gymbon Spilsbury, commenting on the process, said:

"... until the price of foundry pig shall advance to a figure at which it will be profitable to purchase 68 pct iron-ore at 6¢ a unit, it is not probable that the Edison works can be run continuously at a profit. It stands, nevertheless, a monument of perseverance in original research which certainly deserves our admiration."

The rock passed through a series of crushers until they came to the 14-mesh screen. The "giant" rolls were 6-ft diam, 6-ft face, and placed 7 ft 3½ in. apart on centers. The rock went from the "giant" rolls to intermediate rolls. After a third set of rolls the rock went to a dryer. Crushing machines were driven by a horizontal compound engine, rated at 700 hp, using steam at 150 psi. Two Climax type boilers supplied the steam. After screening, the magnetic separator invented by Edison took over. The separator was simple and cheap to operate.

THOMAS ALVA EDISON

"When a thin stream of material is allowed to fall by a stationary magnet, those particles which are subject to magnetic attraction are deflected from their path toward the magnet. Two parallel streams of material are formed, one behind the other, which may be readily collected in different receptacles."

One of the most important facets of Edison's Ogden mine operation was the necessity for keeping costs at a minimum. Conveyor belts had been used to transport grain, but before Edison employed them at Ogden, they had never been adapted for ore handling. The first belts used at Ogden were 20 to 30 in. wide, and as long as 500 ft between centers. Ore abrasion wore them out quickly. Repair and renewal bills were high. That was the situation when Thomas Robins, Jr., visited the mine for the first time. He noticed that the thin layer of rubber which covered the belt resisted the abrasion much longer than did a corresponding thickness of cotton duck which formed the body of the belt. Each layer or ply of duck wore more quickly than the preceding one. Wear was greatest in a line along the center of the belt.

Robins had a belt made with a thicker layer of rubber on the carrying side. It was also thicker in the center. Edison was quick to go along with the idea and experiments at the mine were successful. Eventually, using the mine as a kind of laboratory, Robins developed an improved mechanism for carrying the belt. It consisted of a set of rollers or idlers arranged on angle brackets, raising the sides of the belt to form a trough. It eliminated the need for guide-boards and increased belt life.

Edison pushed experiments in concentration and separation at Ogden as long as it appeared that work would lead to an economic process. One day the inevitable had to be faced. Mesabi range discoveries of tremendous reserves of high grade iron ore meant the end of low grade concentration. **M. A. Matzkin**