EDITED BY RUTH A. GALLAHER

VOL. XXVIII ISSUED IN JULY 1947 NO. 7

Sol

Abram Tuston Hay

While it is true that all through the years manufacturing flourished in many of the larger cities of Iowa, especially those located along her bordering rivers, the general impression has prevailed that her chief stock in trade was agriculture, not industry. This, undoubtedly, is correct even today. If, however, one were to select certain examples of Iowa's many interesting and sometimes unique industrial establishments, an important chapter of the State's history might be written which would be so filled with romance as to intrigue even the most unimaginative reader. These industries are sometimes located in strange and seemingly inexplicable places. Why should Newton, for example, become the washing machine capital of the world, Red Oak be a calendar-printing center, Fort Madison have the country's leading manufacturer of pens, and Shenandoah be the home of some of the world's largest seed-houses? However, were one suffi-

193

ciently familiar with all local factors, he might point out some rational explanation for the location of each industry. The reason would frequently be found to be the guiding hand of a single individual, some genius particularly talented, versatile, and energetic. In other words, the human factor looms large as the immediate reason for many seemingly misplaced industries.

Moreover, in industry as well as in other undertakings, the particular individual who may have made the greatest contribution to its beginning and ultimate success has occasionally been almost completely overlooked. David H. Moffat, for instance, who conceived the idea of the great Moffat Tunnel and spent a sizeable fortune promoting it, died poor and was buried in a grave practically unmarked for many years. William Kelly invented a process for manufacturing steel similar to that of Henry Bessemer, but both the fame and the financial reward went to Bessemer. Abram Tuston Hay, of Burlington, Iowa, while not altogether unknown, should likewise have received far more recognition for his work than he did. It was almost entirely through his early efforts, research, and inventive genius that the first successful method of manufacturing steel for bridges and other structural purposes in America was developed. Many of the processes he in-

vented and perfected were far in advance of his time, yet there is rarely a person, even in the steel industry today, who has heard his name mentioned in this connection. The originator of "Hay's Steel Process" is certainly one of the unsung heroes of industry.

Born on August 30, 1826, in Philadelphia, Abram Tuston Hay came from a long line of notable ancestry, dating back to colonial times. His grandfather, Edward Hay, was born in Scotland in 1756 but came to America before the Revolutionary War and settled in the city of Philadelphia. Here he married Martha Tuston, whose family name was later bestowed upon the subject of this sketch. Edward Hay, Jr., the youngest of their six children and the father of Abram Tuston Hay, was born on March 2, 1800. Too young to enlist as a soldier in the War of 1812, he volunteered as a drummer boy in the American army. He came through the war unharmed, "with glory and with experience beyond his years", and on November 21, 1822, he married Hester Lightcap at Jenkintown, Pennsylvania. Both her father and grandfather had served in the Revolutionary War. The home was established in Moreland Township, now a part of Philadelphia, where their children were born.



In 1835, when Abram was nine years of age, the family moved to Franklin County, Ohio, where they settled upon a "timber claim" in Pleasant Township. There, with his two brothers, Abram "helped clear the mighty forests from one hundred acres of land."

His father was a blacksmith and Abram early learned the trade and became familiar with the art of welding and tempering iron. Thus were sown the seeds of interest in the nature and uses of metals. During his formative years, however, educational advantages in so new a country were meager or absent altogether, and the boy, like many other pioneer sons, laid the foundations for his later comprehensive studies "both in science and philosophy, by the light of the log fires at the close of a day's toil." In his twentieth year, opportunity came for him to enter the academic department of Central College, Ohio, where he enrolled in "an independent course in the higher branches". Here he pursued courses in "English grammar, natural philosophy, chemistry, astronomy, and the high branches of mathematics."

Leaving the academy in 1848, after two years of study, he taught school in London, Madison County, Ohio, where he remained until July, 1849. The following October, he began work as clerk



and salesman for a wholesale grocery concern at Columbus, but not finding the business to his liking, he resigned his position and took up telegraphy, which was then in its infancy. He worked in the Columbus office of the Morse Telegraph Company until the spring of 1851, when he went west to Missouri, via Cincinnati and the Ohio River. He reached St. Louis on the twenty-fourth of April and commenced working for the "Illinois and Mississippi Telegraph Company" the following day. Almost immediately he was sent to Keokuk, where he became manager of the Iowa division of the company's lines, with headquarters at Burlington. While engaged in the telegraph business, he obtained an elementary knowledge of the theory and practice of electricity, laying the foundation which later also aided him greatly in his metallurgical research and experiments. He remained with the telegraph company until July, 1854, when he quit to take a position in a United States Land Office located at Brownsville, Minnesota. He remained with the Land Office until March, 1856, when he resigned and started a land business of his own which proved a profitable venture.

The young man, however, had time for romance and early in 1856 he returned overland to Burlington, Iowa, where on the twenty-second day of



January he married Miss Amelia Smith, daughter of Jeremiah Smith, who had made some of the government surveys in the Black Hawk Purchase in 1832, settling in Flint Hills (Burlington) the following year.

The young couple, it is said, traveled by rail to Dubuque (on railroads in Illinois), and thence by stage and sleds to Brownsville, via Decorah. River traffic, of course, was closed by the ice. The young wife was thus introduced to the rigor of a northern winter and the rough fare of the frontier. After his resignation from the Land Office, Hay removed to Chatfield, in Fillmore County, where the couple resided for a short time, but in 1857 he gave up his business in Minnesota entirely and he and his wife returned to Burlington where they made their future home. Hay had spent his spare time in studying law and had been admitted to the Iowa bar. He now opened an office in Burlington, engaging in the practice of law and doing business in land. In this venture, he was associated with John M. Corse, who won fame in the Civil War. The partnership seems to have been mutually profitable. The business consisted largely in the prosecution of Civil War claims and the transfer of land and land warrants. Hay continued this business until the spring of 1866, when failing health



made it necessary that he engage in work of less confining nature. This misfortune, however, gave him an opportunity to pursue the scientific investigations in electrical phenomena and the chemical relation and affinity of minerals in which he had long been interested.

The following year, 1867, he completed his first researches into the nature and causes of steam-boiler explosions which at that time occurred frequently on steamboats and in mills. He came to the conclusion that the "foul water" was the chief source of danger and published his conclusion that proper treatment of the water would largely eliminate this difficulty. His theory was immediately taken up, widely discussed, and finally accepted by many boiler inspectors and engineers. This discovery came at an opportune time. Steam railroads were fast coming into the country and had Hay made no other contribution to the cause of safety in transportation, his name would deserve a place among the great benefactors of humanity. Water treatment plants were soon established wherever boilers were used.

About this time he received a patent on a process of using magnetism to reduce and purify the ores of metals, and "for the application of a direct circuit of electricity to steam boilers as a protective agent against corrosion and incrusta-



tion" — two things which made the use of boilers hazardous.

In December, 1870, at the request of United States Inspector James H. McCord and other officials, he investigated the dangers to which the traveling public was exposed by the transportation of petroleum products on passenger steamers. His report attracted wide notice and the subject was brought before Congress. As a result a law was passed in February, 1871, prohibiting the transportation of coal oil and other inflammable materials on such vessels. Here again he contributed advice and information which doubtless

resulted in saving countless lives.

In April, 1872, at the request of his friend, John H. Gear, then a member of the House of the State legislature, Hay examined the foundation of the Capitol building, then in course of erection. His report, it has been said, condemned the structure "mechanically, geologically and chemically". Official investigators concurred in this judgment and the General Assembly adopted a resolution ordering that the defective work be taken out, at a cost to Iowa of some \$52,000.

Hay's first patents covering improvements in methods of welding steel and iron were granted in November of 1872, and by August of 1873 he had applied the process successfully to the making







of fine iron and the welding of scrap steel in a plant at St. Louis. In 1876, with John H. Gear, M. S. Foote, G. R. Henry, and others, Hay organized the Hay Metallurgic Company, to handle the Hay patents. The following January, the Hay Steel Company of Chicago was formed. This was a big step forward and placed him in line for greater achievements.

On the ninth of September, 1878, the Hay Steel Company, under his supervision, commenced work on the metal for the first all steel bridge ever constructed. This structure, which was completed the following April, was erected by the Chicago and Alton Railroad Company over the Missouri River at Glasgow, Missouri, under the direction of William Sooy Smith, a prominent structural engineer employed by the railroad. Not a pound of iron, it is said, was used in the bridge. Every beam and chord, every bar and rod, and even the nuts and bolts were all made of steel manufactured by the "Hay Process". On June 7, 1879, Mr. Hay, upon special invitation, attended the formal opening and dedication of the new bridge at Glasgow in the presence of more than ten thousand spectators and guests of the Alton Railroad. This honor, no doubt, was one of the crowning achievements of his life. The



following September, he directed the manufacture of the metal for a second all steel bridge to be built by the Burlington Railroad across the Missouri River at Plattsmouth, Nebraska. The proven strength and success of the previous structure had much to do with this contract. Three hundred tons of "Hay Steel" were also manufactured for the reconstruction of the bridge across the gorge at Niagara Falls.

In 1881 and 1882, Hay was associated with the Union Steel Company of Chicago in the manufacture of steel rails. In February, 1883, he and his family moved to Joliet, Illinois, where he was connected with the Joliet Steel Company, also engaged in the manufacture of rails. Later he was engaged in the manufacture, by a laminated process patented by him, of tough steel for such special purposes as jail cells and safes. The manufacture of jail equipment, thus begun in a small way, is still carried on in Joliet by one of the few firms now in the business. The world's largest horseshoe factory, employing a modification of his laminated process, also operates at Joliet as does the country's largest wire mill, all being a direct or indirect heritage handed down from Hay's earlier activities.

He was later, with marked success, associated with the Midland Steel Company of Muncie, In-



diana, and with the Tudor Iron Works of St. Louis, Missouri. In August, 1894, he was compelled to give up work due to an injury to his foot while in St. Louis. A gangrenous condition developed, forcing him to return to Burlington the following October where he was confined to his bed until his death on January 22, 1895, at the age of sixty-eight years.

Funeral services, with the Reverend J. C. Mc-Clintock of the Presbyterian Church and the Reverend William Salter of the Congregational Church officiating, were held at the home on West Avenue on January 24th. Interment was in Aspen Grove Cemetery. Appropriate resolutions were passed by members of the Des Moines County Bar, who attended the obsequies in a body. It has been said of him that "he was a lawyer, scientist, philosopher and inventor, and believed everywhere in the reign of sovereign law, and saw in the realms of nature what the apostle calls the goodness and severity of God." To appraise the life of so talented and versatile a man as Abram Tuston Hay is a difficult task. Of one thing, however, we may be certain; in all his sixty-eight years, there must have been not a dull moment. His life was one of movement and action, always forward. He was ever out in the forefront and lived all the while in advance of



his times. His influence for progress was out of all proportion to his formal education, and he was in very many ways a great benefactor of mankind. He was not only a keen scientist, but a great thinker and a student of human affairs.

While the world reaped the benefit of his experiments along many lines of investigation, it was said at the time of his death "that in his modesty and unwillingness to seek notoriety for notoriety's sake, he never embodied the results of his studies in book form so as to make them more specifically valuable for other students. But those personal friends who have had the privilege of listening to him in his communicative moods, recall with pleasure the enjoyment they had in social conversation. They were often surprised by the depth of his thought and the original conclusions he drew from the forces in nature which were his real text book." He had, it was said, a deep insight "into the mysterious elements of the world, such as electricity and magnetism, and all those forces comprised within the grand cosmos which have engaged the attention of profoundest philosophers of all ages." These studies and his own discoveries and inventions gave him a wide range of knowledge, seldom possessed by a single individual. He was a frequent contributor to the



local press generally as well as to the scientific and special journals of the country.

It was because of his research and his willingness to depart from accepted standards that he was able to make valuable discoveries in electricity and metallurgy, which stamped him with the genius of a true scientist. He had, it was said, an intuitive grasp of primary principles "which led him to great independence of thought, and often brought him in antagonism with many of the accepted theories of the day." It is typical of the man that such opposition never deterred him in the least from going ahead with his investigation and history has revealed that more often than not, he was correct in his surmises. Indicative of his remarkable sagacity in working with metals, is the fact that he was one of the first to extract aluminum from fire clay by means of an electrolytic process. His product was termed "Aluminum Bronze". Hay accomplished this feat in the early seventies, antedating by nearly fifteen years a similar discovery made by Charles Martin Hall, on February 23, 1886. Hall, however, has always been given full credit for the perfection of this method of refining aluminum from its ores, an honor which, without doubt, should have been shared by Hay.

Although a lifelong Democrat, Hay cared very



little for politics from the standpoint of a partisan and he rarely, if ever, attended a caucus or convention of his party. Indeed, he seldom voted. He was interested, however, in politics in a broader sense and delighted to discuss great measures and principles. He believed in the principle of free trade, but he was not an extremist and he believed in applying business methods to the construction of a tariff.

In one political issue he was, however, deeply interested. He was an ardent advocate of the free coinage of silver and contributed many articles to the press denouncing the demonetization of silver in 1873 and demanding the restoration of the white metal, claiming that the silver dollar was the original standard of our monetary system contemplated by the Constitution and sustained by the laws of the country until the action of Congress in 1873. Many of the best scholars and businessmen of the Middle West found delight and profit in discussing with him the practical affairs concerning agriculture, mining, and manufacturing. Such, very briefly, was the character, personality, and abilities of Abram Tuston Hay, who must be rated as one of Iowa's illustrious citizens.

BEN HUR WILSON