

HAYWARD AUGUSTUS HARVEY.

Hayward Augustus Harvey was born at Jamestown, N. Y., January 17, 1824.

He was the son of Gen. Thomas W. Harvey and Melinda Hayward, who had moved from Wardsboro, Vt., to Jamestown in 1814.

The line runs back through Rufus, Jonathan, William and Thomas to William Harvey, the emigrant, who was one of the early settlers in the Massachusetts Bay colony.

The father of the subject of our sketch was a skilled mechanic, who went to Jamestown under contract to set up the machinery for a cotton factory. This enterprise fell through, and he remained as the village blacksmith.

"The smith, a mighty man was he," indeed, for he measured 6 feet 3 inches in his stockings, and weighed 280 pounds. During the time he lived in Jamestown he, with his brother Charles, built most of the machinery used in the factories that were started in that enterprising town.

Gen. Harvey was a brigadier-general in the New York militia, and he was an inventor of great fecundity. His inventions include many mechanisms now in general use. He was pioneer in automatic pin machinery and screw machinery, into which he introduced the toggle joint and the cam movement. He was the inventor of the gimlet pointed screw. He was, perhaps, the first to depart from the old blister or cement process and to introduce the manufacture of crucible steel.

In 1842 he ran all the machinery in his machine shop by a magneto-electric engine. As early as 1841 he remarked to the late Dr. Hazeltine, at that time an inmate of his family: "If you live to the ordinary age of man, you will see electricity the great motor power of the world."

He was one of the founders and at one time president of the American Institute.

In 1833 he moved to Ramapo, and in 1836 to Poughkeepsie. His family moved with him, and here his son Hayward was educated, attending school in the academy, and later in the academy at New Paltz, N. Y. From this school he went to his father's factory, at Poughkeepsie, where he learned draughting and various branches of mechanical engineering.

The Poughkeepsie Screw Manufacturing Company was organized in 1836. Gen. Harvey was one of the incorporators, and the plant was based upon his inventions. These were patented in 1846. The product was the gimlet pointed screw.

In 1844 the New York Screw Company was organized, with Gen. Harvey as president. Hayward A. Harvey was appointed the draughtsman. The English patent officials of that day pronounced his drawings to be the best that they had received from America.

In 1849 the Somerville, N. J., company was reorganized as the Union Screw Company, and young Harvey took charge of the wire mill. In 1851 he went into the wire business in New York, but was burned out within a year. In 1852 he entered the Harvey Steel and Iron Company, of which his father was president, and whose works were established at Mott Haven. They also had a small company at Canaan, Conn., called the Waugum Iron Company, which was devoted largely to experimental studies in the metallurgy of iron and steel.

The death of Gen. Harvey, in 1854, turned Hayward's attention from the study of these subjects, and he devoted himself for the next thirty years to inventing and improving automatic machinery. During these years he was at times closely connected with the American Screw Company, of Providence.

His first invention was the corrugated blind staple, which was invented when he was eighteen years old and is in universal use at the present time.

In 1865 he founded the Continental Screw Company, of Jersey City, which became the owner of his first patents on screw machinery, covering the entire process of wood screw making. This company after a short time was bought out by the American Screw Company.

From 1870 to 1890 he was constantly at work designing new machinery for making screws, bolts, wire nails, washers, spiral springs, and many similar articles.

In 1875 the Harvey Manufacturing Company was formed with Mr. Harvey's new track bolts as its product. In his first bolt, the thread on the bolt was formed with a varying pitch, and the thread of the nut with a uniform pitch, or vice versa. The nut is locked by the upsetting of the threads. There were several varieties of these bolts. They were favorably received by the railroads and are widely used. The Kansas City Bolt and Nut Company now make bolts of Mr. Harvey's invention.

In 1881 the Harvey Screw Company was formed to

manufacture and sell the product of the "rolled screw" machinery, which was the most notable of his inventions during this period. Instead of the thread being cut into the wire, it was partly rolled into and partly pressed out from the surface of the blank by a cold forging process. These screws have a sharp central point, which, with the large thread and the small neck, make the entrance into the wood easy. This company was later merged into the Harvey Screw and Bolt Company.

One variety of these screws had two knobs on the surface of the head instead of a nick. The ordinary tapering screw and the gimlet pointed screw were also



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made on these machines. These inventions revolutionized the art of screw making and about 1886 became the property of the American Screw Company, of Providence, and of the Nettlefolds, of England.

Notwithstanding the efficiency of the "grip" bolt, many engineers demanded a washer or nut lock. To meet this demand Mr. Harvey invented the "ribbed spiral" washer, which was manufactured by the National Lock Washer Company. Within six months after formation this company was paying substantial dividends, and has remained a handsomely paying property up to the present time.

In 1891 the American Washer and Manufacturing Company was formed to manufacture other products of his inventive skill, viz., washers and spikes, but they have confined their attention to the "Harvey ribbed" and the "coil" washers.

These washers have been widely adopted by many

temper. In 1888 patents on this new product and process were granted to Mr. Harvey, and works were established in Jersey City, afterward moved to Newark.

Later studies and experiments by Mr. Harvey led to the world-famous invention of the Harvey armor plate product and process. It is interesting as an historical fact that in 1891 the armor makers of England and the Continent had for a generation been trying to keep pace with the improvements in the projectile, and had fallen farther and farther behind, and that in America armor had not been made, although expensive plants had been erected for that purpose; yet on the very proving grounds where the armor plates of various foreign armor makers were being tested to determine which should be used for the new American navy, a small piece of steel armor lay unnoticed which was to revolutionize the whole art of armor plate making.

This plate had been treated by Mr. Harvey at Newark, on ideas of his own, and was tested at Annapolis a few days previous to the competitive test.

A few weeks later a full sized plate was tested, and the United States adopted it as the type of armor for the new ships. The European governments soon followed, and to-day Harveyized armor plate is the recognized standard of the world.

An intimate business friend has written of him as follows: Mr. Harvey lived long enough to see the fruits of his labors and to participate in the profits. He was emphatically a progressive man. When his mind was engaged in inventions, it was difficult for him to stop; he always saw so much beyond. His processes of thought were entirely original. In making his inventions he usually declined to be guided by the experience of others. The fact that some one had done a certain thing in a certain way almost always made him reject that way and look for a path of his own. He was a singularly persuasive man, as he must needs be to get the attention and the confidence and support of prominent capitalists, in which he was very successful. Although always a positive man, yet it is doubtful whether he left any enemies behind him, on account of his sympathetic and really lovable nature, which made warm friends for him among all classes of men.

Mr. Harvey died at his home in Orange, N. J., on August 28, 1893. At the time of his death he was president of the Harvey Steel Company and vice-president of the American Washer and Manufacturing Company.

The history of screw making in America would be very meager if we should leave out the work of the Harveys—father and son. Their ideas were always original and far reaching in their influence, and it is doubtful whether anywhere screws are made without taking advantage of principles discovered and developed by them.

Similarly in the metallurgy of steel their influence has been important. The elder Harvey was a careful and brilliant experimenter. His son was trained by him, and the great achievements of the younger Harvey are the crowning results of many years of experimentation and thought.

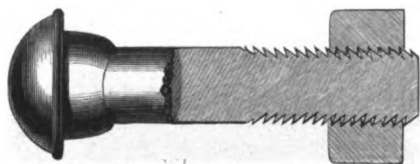
Mr. Harvey took out seventy-nine patents, nearly all in the lines indicated above.

Coal from China.

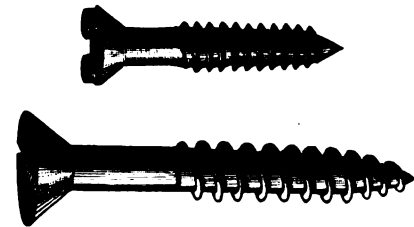
It is rather startling to find that coal can be mined in China and sold in California at a profit, says Locomotive Engineering. Several cargoes of coal from China have been imported into California, and it is reported to be of very good quality.

Those who are familiar with the coal market say that within a very few years the Chinese coal mines will supply the whole market of the Pacific coast, except those portions where coal is found. The extremely cheap labor of China enables the coal to be brought to the surface at a very low price. The only obstacle to very active competition in this industry at present is the want of good transportation facilities in China. The extension of Chinese railways, which has begun very actively, is going to exert a very prejudicial effect on the coal mining interests of the United States and Great Britain.

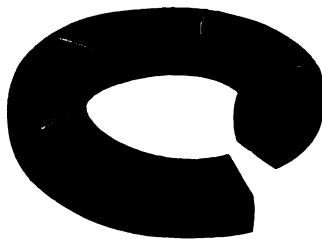
According to the New York Evening Post, George A. Brill, of Poughquag, Dutchess County, who was graduated from Cornell University in 1888, recently received a cable dispatch from Li Hung Chang offering him a liberal sum to organize and manage a model farm in China under the government. He will accept the offer and will soon leave for China to enter upon his duties.



BOLT WITH VARYING PITCH.



COLD ROLLED SCREWS.



SPRING WASHERS.

railroads and in many comparative tests have always been found among the best.

While experimenting with bolts and nuts, Mr. Harvey conceived the idea of making a bolt and nut of cast iron, with threads partially impressed on them in the mould, and then of hardening or "steelifying" the surface of the threads of the bolts and nuts so as to give them the necessary hardness.

The experiment was a failure, but the character of the product indicated that he had made a discovery in the metallurgy of steel. Experiments following this indication resulted in the production, from low grade Bessemer steel, of steel capable of taking the finest