

HISTORICAL NOTES ON GREENFIELD TOOL INDUSTRY

In early Colonial days the requirements for tools were very limited, and most tools were produced by village artisans for their own or their neighbor's use. Most farm implements were made from wood, with the few metal tools such as axes, saws or chisels imported from England. Spinning wheels and looms were made at home or by local cabinet makers or carpenters. There were many early tradesmen, such as carpenters, blacksmiths, coopers, tailors, printers and weavers, and a few gunsmiths in the Colony. You may be interested in the list of tradesmen who came on the Mayflower in 1620; among the 53 adult male passengers there were 15 tradesmen listed as follows:

- 1 blacksmith
- 1 wood sawyer
- 1 wood carver
- 1 cooper
- 2 printers
- 2 tailors
- 1 wool comber
- 4 weavers
- 1 hatter
- 1 silk worker

In addition there were 4 mariners, 6 merchants or shop keepers and 1 physician.

With the coming of the industrial revolution in the latter part of the 18th century, there was a demand for metal working tools. We in Greenfield are more concerned with screw threading tools, so I will limit my subject more closely to the threading tool industry.

Screw threads and the tools to produce them developed very slowly through hundreds of years. Probably numerous mechanics, working independently developed various crude tools for cutting threads. Black smiths and armorers made their early screw threads by forging and filing and their products were extremely crude by modern standards. Gunsmiths and clock makers required smaller and more accurate screws. They usually had small lathes operated by foot power, and turned metal with hand tools just as we turn wood today. They were able to produce screw threads by using hand chasers. With skill and some practice quite good screws could be made in this way. But all through hundreds of years there was little accuracy or uniformity.

John J. Grant told of an old wooden screw and how it was made. He was repairing some machines in a factory in Easthampton in 1865, when he took a walk one evening and found an old cheese press under a shed. At that time he was preparing to manufacture emery wheels and required a press to squeeze the material into shape for solid grinding wheels. He purchased the press for ten dollars from the man who had seen it made about 70 years before. The entire press was made of wood and the screw was about 6 inches in diameter and 6 feet long, with a head about a foot in diameter and 10 inches long, with an iron band at each end of the head. A bar inserted in a cross hole in the head was used to operate the screw. The screw had a lead of 2 inches and the thread had an included angle of about 90°, flattened about $3/16$ " at the crest. A line was marked around the blank where the threads would start. Then a piece of heavy paper, with a length equal to the circumference of the screw was cut diagonally from 2 inches at one end to a point at the other end. A line scribed along the diagonal edge of the paper made a guide for the lead of the screw. A skilled carpenter then proceeded to work the thread to shape. The nut

was made in halves, with the threads cut out with hand tools, and by running the halves back and forth on the screw the threads were corrected. After the threads were finished the 2 halves of the nut were bolted together on the screw and the sides faced off square. Mr. Grant said the lubricant used was mutton tallow, but the man who made the screw had more than tallow in his head. With the invention of Henry Maudsley's "Slide Rest Lathe" in England, about 170 years ago, it became possible to cut screw threads in quantities with approximately duplicate dimensions.

David King, a blacksmith of Waterford, N. Y. made taps for his own use by forging the blanks and filing the threads with a three corner file. He wrapped wire tightly around the tap blank and scratched a guide line along the wire, the coils being spaced for the lead of the thread. After removing the wire the file was used to follow the guide line. He was a skilled workman and sold some to other blacksmiths until he purchased a lathe in 1828 and started to manufacture taps for the market. He was probably the first American manufacturer of screw threading tools. He was joined by his son John and a neighbor named Holroyd, who started a tool business of his own after learning the trade in the King shop. Holroyd made a doubtful claim to have produced the first screw plates about 1860. With two shops making such tools, Waterford was the home of the early tap and die industry, but their plants became obsolete and both closed about 60 years ago. F. E. Wells & Son purchased some of the Holroyd equipment and moved it to Greenfield.

The first mention of screw threading tools in Greenfield was in an advertisement of Draper & Co. who had a shop at the east end of the Bascom dam, just above the present Wiley & Russell dam. In 1835 they advertised emery wheels, scythe snaths and screw plates. Probably all of these early screw plates were actually jamb plates.

In 1833 John Russell started to manufacture chisels in a shop located about at the site of the Gas Company's plant on Mill Street. His shop was powered by a 16 H.P. steam engine, the first in Greenfield. In 1836 the Draper shop at the Bascom dam was swept away in a flood. Soon after this the Russell chisel shop burned and Mr. Russell first considered moving to Nash's Mills, but he finally built a new shop at the Bascom dam, which became the famous Green River Works, producing cutlery. Mr. Russell lived in the place we now know as the Germania House on Mill Street. The John Russell Cutlery Co. outgrew the water power at the Bascom dam and moved to Turners Falls in 1870 where they built the largest cutlery factory in the U. S., and it is now combined with the Russell-Harrington Co. in Southbridge.

After removal of the Cutlery to Turners Falls, John Russell's brother, Nathaniel Russell, was looking about for an industry to use the abandoned plant, and also to get his nephew, Charles P. Russell, into business. In 1869 Solon L. Wiley, a native of Saxtons River, Vt., came to town and contracted to lay the pipe line from Leyden Glen Reservoir to the village. He lived in the house now occupied by William Davenport on Congress St. He was also casting about to enter some business after completion of his contract.

A rather remarkable young man had arrived in town shortly before this in the person of John J. Grant, who was born in Leicester, England in 1845. He came to Providence with his parents in 1847, and at 13 he started a four year apprenticeship in the Brown & Sharpe machine shop. When 18 he came to Northampton and worked in a machine shop for two years, then started a machine shop and manufactured emery wheels, the beginning of the Northampton Emery Wheel Co.

After the close of the Civil War, Luther C. Pratt had a small

machine shop in the "Steam Mill" now Wells Tool Company building on Hope St. John Grant was first an employee and later a partner, the firm being Pratt & Grant; and they carried on a general machine business

One day a traveling salesman suggested that there was need of a good bolt threading machine and Grant proceeded to design such a machine for threading bolts and nuts. Here he had the first idea of an adjustable die, which was the forerunner of the Lightning Hand Die.

Needing a skilled tool maker to make the taps and dies for their machine, the firm advertised, and as a result, they hired Albert J. Smart who was only 20 years old at the time but had received an excellent training in a Lowell machine shop. We believe that Mr. Grant was a rather difficult partner; and in 1870 Mr. Pratt sold his interest to David Goss who owned the Steam Mill, and the firm was reorganized as the CoOperative Machine Co. which claimed to build a full line of machine tools and to build special machinery. Soon after this, Mr. Smart left to go with the Millers Falls Co. at Millers Falls; but in two years he was back in Greenfield with the new firm of Wiley & Russell. When John Grant left Wiley & Russell in 1875, Mr. Smart became superintendent and held that position until he started his own business in 1906.

In designing an adjustable die for the bolt threading machine, Grant conceived the idea of an adjustable hand threading die, which was patented as the "Lightning Die" October 24, 1871. Mr. Grant's die was a radical improvement, as the die was easily adjustable for size, and had the great advantage that it cut the metal instead of crushing it or "worrying" the thread onto the rod, as was the case with the old jamb plate.

In the words of F. E. Wells, Solon Wiley was a "promoter" and seeing the advantages of Grant's invention, he joined with Grant and the Russells to form the Wiley & Russell Co. Grant later went to Hartford

as superintendent of the tool division of Pratt & Whitney, and established their tap and die department. While in Greenfield, Mr. Grant lived at 39 Prospect Street which I believe is now occupied by Matthew Baronas. Mr. Wiley left for the West engaging in mining and engineering work, and became prominent in Omaha, Neb. where he died in 1926 at 86 years of age. Mr. Russell was a good manager and the firm grew and prospered, greatly benefiting the economy of Greenfield.

The Reece brothers were employed by Wiley & Russell until 1874, when they started to manufacture round dies (or sometimes called button dies), and later produced taps. They erected the wooden factory at the corner of Wells and Devons Sts. About 1901 this business was controlled by F. O. Wells and managed by Frank A. Yeaw with Edward F. Reece as Supt. About 1910 the business was moved to a new building on Beacon St., now occupied by Hartwin Motors, and became a division of F. O. Wells & Son. Their round dies were blanked out by the forging process, as were the Wells Pipe Dies.

Mr. Albert J. Smart, Sr. succeeded Grant as superintendent of Wiley & Russell. Mr. Russell said, "You are only a boy Albert, and you will have the job on a temporary basis until we can get a new superintendent." So Mr. Smart told me in a joking way, "For over 30 years, I didn't know if I had a steady job." In 1906, Mr. Smart and his sons, Roy and Charles (Ned), with Rollin Bascom organized the A. J. Smart Mfg. Co. to manufacture taps and dies and started in the building now occupied by the Mohawk Engraving Co., on Chapman St. later moving to the F.W. Webb building known as the shoe shop on Hope St. and sold to Greenfield Tap & Die Corp. in 1913. Ned Smart was Superintendent at G.T.D. Plant 2, in 1918 and is now Chairman of the Board of the Gurley Co. in Troy, N. Y. Before his death, Roy Smart was a partner in the

Gardner Tap & Die Co. of Cleveland, Ohio, with Jack Gardner, whose father, Fred Gardner, was a Wiley & Russell employee in 1875, leaving to establish the Besley tap shop in Beloit, Wisconsin.

Elisha Wells was an early salesman for Wiley & Russell. He would load a stock of screw plates in his buggy or sleigh and sell to blacksmiths along the way, going as far West as Ohio and Michigan. He was a skilled metal worker, having been foreman of the forge shop at the gun factory in Windsor, Vt. during the Civil War. His son, Frederick E. Wells, was also employed in the gun factory during the War. The Wells family lived in Buckland where F. E. Wells attended the old brick school, since torn down, to the age of 14 years, when he started work at the Lamson & Goodnow Cutlery in Shelburne Falls, with his father. During the Civil War the forge shop at the Cutlery burned and Mr. Lamson sent Elisha Wells and his son Frederick E. to Windsor, Vt. at the Jones & Lamson Co. to continue the production of forgings for the Army muskets being made in Windsor. If you visit the Jones & Lamson plant in Springfield, Vt., you will see a display of Civil War guns which they produced. Frederick worked as a bookkeeper for Wiley & Russell, while his younger brother Frank O. Wells was an apprentice in the shop; and I have heard him say that he was glad to have served under John Grant, who was a mechanical expert, but F. E. Wells said, "Grant was poison to a business."

Frank O. Wells was an apprentice at Wiley & Russell at 16 years of age, and was fortunate to have worked with men like John Grant and Albert Smart. He was anxious to perfect himself in the trade, so asked, "Who is the best toolmaker in town?" He was told that Simeon Phillips of Conway Street who worked at the Greenfield Tool Co. was considered to be the best. So Frank Wells went up to call on Mr. Phillips

one evening after supper and found him working in his garden. After introducing himself, he asked, "What is the best way to make a die?" Mr. Phillips told him that the best die should be made from a worn out flat file. He said, "Anneal the file, drill and tap a hole in the center of the file with four clearance holes around it. File the cutting edges and re-harden it, and you will have a better die than those new-fangled ones made by Johnny Grant." The boy, Frank, went away disappointed and never returned for advice from the so-called best tool-maker in town.

The Wells brothers boarded with the Grant family on Prospect St. F. E. Wells worked in his spare time at the B. B. Noyes shop, on developing a better die and finally applied for a patent on what is now known as the "Little Giant" which brought more prosperity to Greenfield than any other single invention. Mr. Russell thought this patent should be assigned to Wiley & Russell, but Mr. Wells refused as he had designed and made models on his own time and at his own expense. Because of this refusal, Mr. Russell decided that he could dispense with the services of the Wells family; so the two brothers planned to start in business and manufacture the "Little Giant." They sent a telegram to their father who was in Ohio, to return home; but he didn't waste money on telegrams, so in about a week they received a letter from father saying that he had a stock of screw plates and would peddle them along his way home. The old fashioned jamb plates sold for \$5.00, but the more modern screw plates sold for \$25.00, with the first \$5.00 payment going to the salesman, and the customer paying \$5.00 per month for the following four months, with no contract, but depended on the customer's honesty.

Upon arrival home, Elisha Wells and his two sons pooled their

meager resources and found they had a total of \$1,100.00 to start a tool manufacturing business in rented quarters at the old shop on Green River below the Gas Works. Within two months their little shop was burned with a loss of \$1000.00 so they moved into the basement of the B. B. Noyes building on Hope St. until their shop was rebuilt. In 1879 Franklin E. Snow joined them, handling sales and the business end of the concern. Through his efforts their sales expanded rapidly, and they decided to build a new plant.

Mr. F. E. Wells noted that J. H. Sanderson owned considerable open land east of Federal St., so he approached him with a proposition which Mr. Sanderson accepted. Wells Brothers were to build a new plant if Mr. Sanderson would give them clear title to the site without charge, provided that they built the shop and employed 90 men within one year. At the end of the year they had over 100 employees, and Mr. Sanderson was selling house lots to some of these employees, so all were happy with the arrangement.

Mr. F. O. Wells and Mr. Snow purchased the share of Mr. F. E. Wells in 1900 and F. E. Wells and his son, Fred W. Wells, started the manufacture of pipe tools on Riddell St. in what is now Plant 4 of the GTD. In 1907 F. E. Wells & Son purchased the Automatic Machine Co. on Riddell St. (in the present Wainshal warehouse), and in 1910 moved their Reece division from Wells St. to the present Hartwin building on Beacon St., and they built the forge plant in Turners Falls. Wells Brothers Co. built a plant at Galt, Ont. which was later sold to Canadian interests.

In 1912, F. O. Wells and Frederick H. Payne organized the Greenfield Tap & Die Corp. which was a consolidation of Wells Brothers Co. and Wiley & Russell Mfg. Co. The G.T.D. purchased the A. J. Smart Co. in 1913 and the F. E. Wells & Son business in 1917.

Many Greenfield men have left the original shops and have been prominently identified with other tool manufacturers. As mentioned before, Fred Gardner went to the Besly Co. in Beloit, Wisconsin. Yale Taylor operates a tap factory called the Beloit Tool Co. George Wilkins left F. E. Wells & Son to become sales manager of the Keystone Tool Co. of Millersburg, Pa. Wellington T. Buffington left Wells Brothers to become superintendent of the Brubaker Tool Co. in Millersburg. Nathan Martin left Wiley & Russell to become superintendent of the American Tap & Die Co., and later was with the Keystone Co. Fred Conant and Walter Donelson left Wells Brothers, started their own shop on Olive St. and later moved to Conway. The Conway shop was sold to Threadwell Tap & Die Co. and recently moved to Greenfield where it is combined with the main plant on Laurel St.

Alexander Gerrett went from Greenfield to learn the machinist trade at Pratt & Whitney in Hartford, but returned to work for John Grant at the CoOperative Machine Co. He went with Grant to the Wiley & Russell Co. and it is said that he threaded the first tap made in the Wiley & Russell factory. Later he was superintendent of Fack, Stow & Wilcox Co. in Cleveland for 30 years. He retired to Greenfield in 1910 and died in 1931.

A number of other tool shops have started in Greenfield, such as Gunn & Amidon in 1853, with a dam on Cherry Run Brook where they made clothes wringers and carpenters' bit braces. After their plant was burned in 1868, and with insufficient water power, they moved to Millers Falls and became the Millers Falls Co.

The Greenfield Tool Co. moved here from Conway in 1854 and manufactured carpenters' tools, principally wooden planes, at the site of the old Threadwell plant on Arch St. This was destroyed by fire in 1887, and when rebuilt was occupied in 1892 by Nichols Brothers, as a

cutlery factory. They had previously operated in the old Hurlburt factory in Bernardston, known as the Hoe Shop, site of the Bernardston Iron Works. J. Henry Nichols became interested in the manufacture of taps and dies. He employed Nathan Martin and started in the former Stratton Bros. level shop on School St., later building the Arch St. plant under the name of the American Tap & Die Co., which is now the Threadwell Co. It is of note that Walter E. Nichols received the first automobile registration in Greenfield on Sept. 1, 190 and we still see Mr. Morton Nichols driving around with the number 216. J. H. Nichols' son-in-law, Gideon Germaine, started the Mohawk Tap & Die Co. in 1923, with tools made on contract by Threadwell and by Bicknell-Thomas Co., but his business was short lived, and he removed to California.

While Mr. F. O. Wells controlled the Heece Co., he built the cement building on Wells St. from plans drawn by G. Walter Carpenter, as an experiment in cement construction about the time of building the Weldon Hotel in 1906. The Wells St. building was occupied until 1955 by Bicknell-Thomas Co. and since then by the Level Department of Millers Falls Co. This Level business was started by Stratton Bros. in 1869 and sold to Goodell-Pratt Co. in 1912. Goodell-Pratt was purchased in 1931 by Millers Falls Co., which is now merged with Ingersoll-Rand Co.

The early tap and die manufacturers were limited in their equipment and materials, and produced only "cut thread" taps, made from carbon tool steel. High speed steel was first used for lathe or planer tools, but was thought to be unsuitable for taps because the heat treatment left a "soft skin" or decarburized surface and a heavy scale on the threads. This caused a demand for ground threads. Winter Brothers of Wrentham, Mass. claim to have marketed the first high speed

steel taps, and the first to grind tap threads in 1914 as a regular product for the Cadillac Motor Car Co.

In 1906 James Hartness of the Jones & Lamson Co. was given a patent on a ground thread tap, but nothing was done to develop it. Some gage makers did very slow thread grinding to correct gages before final lapping. My first knowledge of thread grinding was at Pratt & Whitney in 1913. They ground threads in a lathe, using a steel disk about 6 inches in diameter, belt driven from an overhead drum. The disk had a 60° included angle face which was charged with diamond dust. The previously threaded and hardened gage blanks were very slowly ground to size by this process. The first experimental work on thread grinding at G.T.D. was in 1916, using a charged disk for grinding thread gages, but this method was not successful.

In 1917 Arthur Schoof and Robert Grunwald designed thread grinding attachments and several were used on lathes at G.T.D. Grunwald left G.T.D. and went to Worcester where he developed thread grinding equipment at the John Bath Co. While D. G. Baker was Chief Engineer in 1918 he and Samuel Green of Holyoke designed a thread grinder, the principal units of which were built at the Bicknell-Thomas Co., but the first really productive thread grinders at G.T.D. were designed by George H. Newton, G.T.D. Chief Engineer in 1919-1920. It required specially developed grinding wheels on rugged well-designed machines to produce precision ground high speed taps as we know them today.

Oliver Goodell of Hartford told me that he ground threads, using vitrified emery wheels on breech blocks for coast defense guns at Driggs & Seabury Ordinance Co. in 1898.

After his retirement in 1917, Mr. F. F. Wells purchased

property in Shelburne and engaged in extensive fruit farming operations. But tool making still interested him, and in 1920 with his son, Fred W., he started the Wells Tool Co. to manufacture taps and dies. Mr. F. W. Wells died in 1936 at the age of 92 and his son did not long survive him. The present officers of the Company are Harold A. Gardner, president, and Joseph W. Ballard, Jr., treasurer. They are operating in the original site of the "Steak Mill" the birthplace of the tap and die industry in Greenfield, but in modernized buildings and using modern equipment. Possibly I am the only present resident of Greenfield to have met John J. Grant. In 1933, I accompanied F. W. Wells and A. J. Smart to Plainville, Conn. where Mr. Grant was living with his daughter. He was ill at the time and under care of a nurse, but mentally alert. The three elderly men had a fine reunion with Mr. Grant referring to the other two as his "boys." Both Mr. Grant and Mr. Smart passed on in 1934, and Mr. F. O. Wells in 1935. Mr. C. P. Russell died in 1923 at the age of 83. He had retired from active business in 1912 when he sold the Wiley & Russell business to G.T.D. His sons, Charles C. and Whitman Russell, organized the Russell Mfg. Co. in 1913 to manufacture taps and dies with Herbert J. Smith as Superintendent. Mr. Smith later went with the American Tap & Die Co. and was president of the Threadwell Co. when he retired. The G.T.D. purchased the Russell Mfg. Co. in 1937 and dismantled the plant on Mead St., transferring the employees to the G.T.D. plants.

Mr. Frederick E. Wells, the last of Greenfield's industrial pioneers, passed away in 1936 at 92 years of age.

It was a privilege to have known several of the pioneers in our local industry from whom I received much of the foregoing information, and I wish to pay a tribute to Mrs. Ada Austin whose father

Luther Pratt, induced John Grant to come to Greenfield and started our local threading tool industry. She furnished much valuable information and old time papers.

Herbert M. Darling

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