

# Stretchers and Strainers: Materials and Equipment

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## Historical Review of Nails and Tacks

- David Goist, at

[https://www.conservation-wiki.com/wiki/Stretchers\\_and\\_Strainers:\\_Materials\\_and\\_Equipment#Historical\\_Review\\_of\\_Nails\\_and\\_Tacks](https://www.conservation-wiki.com/wiki/Stretchers_and_Strainers:_Materials_and_Equipment#Historical_Review_of_Nails_and_Tacks)

### Introduction

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Nails and tacks are generally slender metal devices used to join one material to another by impact insertion. They consist of a head to receive the impact, a shank or body to join the materials, and a point. Most general reference sources state that the earliest nails were hand-forged from copper, then bronze, and then iron. The size of a nail is classified by the “penny” because in medieval England nails were sold by the hundred. A twopenny (2d) nail—100 nails that sold for twopence—is one inch in length. A threepenny (3d) nail is 1 1/4 inches, and so forth up to a sixtypenny (60d) nail, which is 6 inches long.

More than 1,100 types and sizes of nails are manufactured. Although most are steel wire, both wire and cut nails are also made of such metals as aluminum, iron, brass, bronze, and copper. The wrought-iron nails once hand-forged by a blacksmith for shoeing horses are now made by machine from low-carbon steel. Nails come in a wide variety of forms, according to the purpose for which they are intended. Nails that are longer than six inches are called spikes. Some nails can be driven into concrete or steel ingots. Galvanized, or zinc-coated, nails resist rusting. Other nails have a resinous coat that melts from friction, forming a strong bond with the wood. Some nails have spiral shanks, like screws, or deformed shanks for a better grip (*Compton's Encyclopedia*).

Much of the research on the history of nails has been conducted by architectural historians who hoped to be able to date buildings. Painting conservators have the same goal when studying nails and tacks found in panel paintings or on the tacking edges of canvas paintings. Both have learned that overlapping technologies prevent the study of nails and tacks from being the sole means of identifying the date of manufacture of an item. As architectural historians have used nails as one of several age indicators, so has the author used them in conjunction with wood identification and X-radiography to judge fabrication dates (Goist et al. 1988, 165–172). It is possible that techniques other than visual examination can help to date the manufacture of nails. One study used metallography in an attempt to develop a chronology (Geselowitz et al. 1991).

Conservators of paintings have documented wooden tacks found used on the edges of at least three dozen early 18th-century American paintings from the Hudson River Valley, Philadelphia, and Jamestown, Virginia (Quandt 1971, 355). When one retrieves wooden tacks from old strainers, a task that is often difficult because they have no heads, they are found to have the appearance and hard—almost waxy—surface of thorns. Identification of the wood by microscopic analysis is difficult because the tacks are highly resistant to cutting (Quandt 1971, 355).

Hand-forged nails are characterized by a square shank that tapers, often to a point, and a multifaceted head formed by multiple blows from a hammer while the red hot nail rod is held in a heading tool:

Historically, the nail-making process began with the smelting of iron ore into large cast “pigs,” which were then remelted and stirred in a process that reduced the carbon content, thus making it forgeable into large bars of wrought iron. When such bar iron was imported (primarily from Sweden), it was often converted for other uses in rolling and slitting mills....By hot rolling the bars into successively smaller sizes, they could be used for a variety of needs, such as iron railings, gates, hinges, or nail plates. Nail plates were rolled to make them narrower and thinner so that they could be run through a slitting mill, thus slitting the plate into long, narrow strips called nail rods, usually about 1/4" square....The blacksmith could put several nail rods into his forge, heat them up, and easily cut them into shorter “blanks” of a workable length. These blanks could then be forged, quickly and efficiently, and made into nails by heating, pointing, cutting, and heading. (Nelson 1991, 18)

The earliest examples of hand-wrought nails a painting conservator is likely to encounter are found in early European panel paintings. In the early 1400s, Cennino Cennini in *Il Libro dell'Arte* (Cennini 1960, 69) advises to cover nail heads with tin foil to prevent the iron from rusting and staining gesso. The nails and foil can be identified within panels by X-ray radiography. The protruding points are often clinched or bent over on the reverse. Nails can also be found holding engaged frame moldings to panels and at the corner joints of strainers and frames.

Nails were an important commodity in colonial America. Many were imported, but a native industry of small shops did develop. By 1789, a tariff was enacted by Congress on many imported items, including nails, for the “encouragement and protection of manufactures.” Hand-forged nails remained available long after cut nails were widely used in the 19th century. In carpentry, wrought nails continued to be preferred for certain tasks, especially when clinching was required. Therefore, it could be supposed that hand-forged, clinched nails might be found in the corners and crossbars of a strainer support long after cut nails became available. George Bisacca has observed that in economically depressed regions, such as early 20th-century Italy, hand-forged nails were more affordable than machine-made ones ([Bisacca 1990, 1999](#)). A “Wrought-Head Decor Nail” (5/8 inch in length with a 3/8 inch-wide head) is still available from the Tremont Nail Company. It is also possible that a person with intent to deceive can reuse antique hand-wrought nails or tacks in a fake painting.

A variety of sources indicate that the first cold cut nails were made in 1777 by Jeremiah Wilkinson of Cumberland, Rhode Island. “The period 1790–1830 encompasses a remarkable transition from wrought to cut nails” ([Nelson 1968, 4](#)). Many patents were issued during that period for improvements on nail cutting machines. However, due to the 1836 fire in the U. S. Patent Office, much primary source information was lost. Maureen Phillips has written on the competitiveness of inventors seeking patents for their nail cutting machines during the late 18th and early 19th centuries ([Phillips 1996, 47–56](#)). “Cut nails manufactured after c. 1830 are virtually undistinguishable from those made today” ([Nelson 1968, 9](#)).

# Chronology of Nail Types from 1790 to Present

by Kim Cullen Cobb

PRE 1800	1790 - 1810	1810 - 1825	1825 - 1830	c.1830-c.1855	c.1855-Present	1890-Present
<p><b>HAND WROUGHT</b></p> <p>DIRECTION OF IRON FIBERS</p> <p>ROUND HEADED      SQUARE HEADED</p> <p>CROSS SECTION</p> <p>NO BURR EDGE</p>	<p><b>MACHINE CUT</b></p> <p>PLATE IS FLIPPED AFTER EACH CUT</p> <p>PLATE IS NOT FLIPPED AFTER EACH CUT</p> <p>PLATE IS FLIPPED AFTER EACH CUT</p> <p>HAMMERED HEAD</p> <p>DIRECTION OF IRON FIBERS</p> <p>CROSS SECTION</p> <p>BURR EDGE</p>	<p><b>MACHINE CUT</b></p> <p>PLATE IS NOT FLIPPED AFTER EACH CUT</p> <p>CUTS ARE ALL MADE FROM THE SAME SIDE OF THE PLATE.</p> <p>DIRECTION OF IRON FIBERS</p> <p>NAILS ARE MOSTLY HAMMER HEADED</p> <p>CROSS SECTION</p> <p>BURR EDGE</p>	<p><b>MACHINE CUT &amp; HEADED</b></p> <p>DIRECTION OF IRON FIBERS</p> <p>SHEARED FROM A PLATE. MACHINE HEADED USING WATER POWERED MACHINES.</p> <p>HEAD IS OFTEN IRREGULAR IN THICKNESS, SIZE AND SHAPE.</p> <p>CROSS SECTION</p> <p>BURR EDGE</p>	<p><b>WIRE CUT NAILS INVENTED IN FRANCE</b></p> <p>DIRECTION OF IRON FIBERS</p> <p>"FRENCH NAILS"</p> <p>HEADED BY HAND AND GROUND TO A POINT.</p> <p>THESE NAILS ARE RARE IN NORTH AMERICA AT THIS TIME.</p> <p>THE FIRST WIRE CUT NAILS MADE IN AMERICA ARE PRODUCED BY WILLIAM HASSALL OF NEW YORK CITY.</p> <p>CROSS SECTION</p> <p>BURR EDGE</p>	<p><b>MODERN WIRE CUT NAILS.</b></p> <p>DIRECTION OF IRON FIBERS</p> <p>USUALLY MADE FROM STEEL WIRE, HELD IN GRIPPER DIES AND HEADED. THE WIRE IS THEN ADVANCED AND SHEARED TO LENGTH WITH A CUTTER DIE.</p> <p>ENDS USUALLY HAVE A FACETTED POINT CAUSED BY THE CUTTER DIE.</p> <p>CROSS SECTION</p> <p>BURR EDGE</p>	<p><b>CUT NAILS ARE ANNEALED TO PREVENT RUPTURING WHEN CLINCHED. FROM 1830 TO PRESENT, NAILS ARE PRODUCED IN MACHINES THAT SIMULTANEOUSLY CUT &amp; HEAD THEM UNIFORMLY.</b></p> <p><b>SPECIAL NOTE:</b> WOODEN TACKS WERE PROBABLY COMMONPLACE IN COLONIAL AMERICA. THEY HAVE A WAXY SURFACE CHARACTERISTIC OF THORNS.</p> <p>WOODEN TACKS</p>

## ILLUSTRATION 43

Early machine-cut nails had handmade heads usually featuring two facets. The shanks, which taper on two sides, in profile being more rectangular than the hand-forged type, were cut from plates that left burrs on the downward stroke of the shear. Earlier machines wiggled the plate to create the tapers while later ones flipped the plate. Smaller cut nails were called "sprigs" and "brads" that at one time had L-shaped heads. The many subtle variations of cut nails, sprigs, and brads can be reviewed in the American Association for State and Local History Technical Leaflet 48 titled *Nail Chronology as an Aid to Dating Old Buildings* by Lee H. Nelson (1968). The leaflet is still available from the Nashville, Tennessee, office (615-255-2971) as a photocopy. Its hand-drawn illustrations are very informative. Maureen Phillips has published a revision of New England's cut nail chronology before 1820 with a useful table describing hand-wrought nails, 17th through early 19th century, to modern machine-cut nails, c.1835– c.1890 (Phillips 1994, 9).

The Tremont Nail Company, Mansfield, Massachusetts, established in 1819 (now a division of Acorn Manufacturing Co. Inc.), has been producing cut nails on the same machines in a factory completed in 1848. A sample set of 20 varieties is available as well as a free catalogue

(800-842-0560 or see [Tremont Nail Company](#)).

“The term wire nail applies both to the present day machine-made nail using wire stock and earlier nails which used wire stock but may not have been made entirely with the use of machines” ([Priess 1973](#), 87). The development of the technology for machine-made wire nails occurred in France in the early 19th century. A French author “lists French patents for wire nails beginning in 1806 and including at least seven up to 1825. Among these early patents is one registered in 1811 by James White, an American resident of Paris, for a machine that cut, head and point a nail in one operation” ([Priess 1973](#), 87). Priess goes on to list various attributions to the beginning of wire-nail manufacture in America as 1851, 1870, and 1875 ([Priess 1973](#), 88).

According to Nelson,

The earliest wire nails were not made for building construction, but rather in the smaller sizes for pocket book frames, cigar boxes, etc....Wire nails did not supplant cut nails with the rapidity that wrought nails were replaced....Wire nails did not really become the dominant type until the 1890s....The greater holding power of cut nails was certainly a factor which delayed the quick acceptance of wire nails. ([Nelson 1968](#), 10)

Common nails have a flat circular head. Finishing nails have a smaller head than the common type, much like a swelling at the top, meant to be driven below the wood surface by a nail set tool.

A painting conservator is less likely to find wire nails securing canvas tacking edges to stretchers because of their generally smaller surface area or lack of surface area at the underside of the head (except for a roofing nail). The author has observed the use of wire finishing nails bent over at an angle securing the tacking edges of lining canvases applied in the 20th century. Alexander Katlan reports finding bent wire nails (sprigs) without a head on paintings “from the mid- to late 19th century” with a specific example of *The Lone Hunter* (1886) by the Russian painter Medem ([Katlan 1995](#)).

## Tacks

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*The Merriam Webster Collegiate Dictionary* states that the word first appeared in 1574. It is based on the Middle English “tak” meaning “something that attaches; akin to Middle Dutch tac, sharp point.” It is currently defined as “a small short sharp-pointed nail usually having a broad flat head.” The term today usually applies to blued tacks. Formerly, carpet tacks had thicker shanks and wider heads whereas upholstery tacks had thinner shanks and smaller heads. These devices are the most common means of attaching canvas to wooden stretchers and strainers in the second half of the 19th century and the 20th century.

When the first machine-made carpet tack was produced is not clear. Maureen Phillips has observed that the early hand-operated machines that cut small nails also appear to have been used for cutting tacks ([#ref94Phillips 1999](#)). An 1872 publication devotes a chapter to “Small Nails and Tacks”:

Ezekial Reed, of Bridgewater, invented, about 1786, a machine for cutting tacks and nails, which, being improved, was used at Abington, making in 1815 one hundred and fifty million tacks. Jesse Reed, a son of the preceding, patented in 1807, a machine for making and heading tacks at one operation, at the rate of sixty thousand a day.... The business, however, having been thus established, in 1817 a patent was granted to Samuel Rogers and Thomas Blanchard, of Boston, Mass. This machine, known as the Blanchard machine, has with Reed's, above mentioned, superseded all others. ([Greeley et al. 1872](#), 1074)

The text goes on to discuss a representative company, A. Field & Sons in Taunton, Massachusetts, which used about 225 machines of the Blanchard and Reed patterns. “The range of their manufacture includes about a thousand varieties of small nails and tacks, which are made of iron, zinc, copper, steel, and in fact, from every variety of material used for this purpose” ([Greeley et al. 1872](#), 1077).

At the turn of the century, there were reported to be approximately 90 tack companies. The author has pulled tacks as short as 1/4 inch from a c.1825 unlined American painting, although 2-inch and 3/4-inch lengths are more common in the 19th and 20th centuries. Today, the Holland Manufacturing Company of Baltimore, Maryland, and D. B. Gurney Company of Massachusetts are the only two in America making carpet and upholstery tacks. The Holland Company makes blued tacks ranging from a #2, 1/4 inch to a #24, 1 inch in length. The family-owned company still uses turn-of-the-century, Perkins tack machines ([Holland 1997](#), [1998](#)). Mr. Richard Holland described the manufacturing technique as follows:

1. Material arrives as 36-inch wide x 30-inch long steel sheets.
1. They cut strips parallel to the 36-inch side whose width is approximately the length of the tack to be made.
1. Once fed into the tack machine, small wedge-shaped pieces are cut from the end of the strips.
1. The machine then transfers these pieces to an area where they are gripped, one at a time, by a set of shank forming dies.
1. The “header” then mashes the remaining material on the end, while the gripper holds the wedge-shaped piece. The heads can be irregular in shape.

1. “Bluing” is an attempt to sterilize the tacks for upholsterers who put them in their mouths so they could be picked off the tongue with a magnetic hammer. The process consists of a water wash followed by the “bluer” (a tube heated by gas to 600°F.). The heating does not change the metal but turns it blue. If not heated to the correct temperature, the surface of the tack appears grey. The bluing process began in the 1920s and was the accepted standard by 1930.

Mr. Holland stated that there are some small forming differences between British- and American-made tacks. Greater differences exist in the rest of Europe and the world in general. Some European and Asian tacks are made from square-rolled wire and are not at all like American cut tacks.

The D. B. Gurney Company of Whitman, Massachusetts, was established in 1825. They made cut tacks from plates but now produce shoe tacks. Tower Manufacturing of Madison, Indiana, sells blued tacks that are made outside the United States. The company still makes aluminum and copper tacks.

Other types of tacks are those commonly called “thumb tacks.” They have slightly convex heads whose diameter usually equals the length of the pointed pin shank. The heads are polished, painted, or coated. The author has rarely found thumb tacks used on tacking edges, so no research was attempted. One type of thumb tack was found on the tacking edge of an unlined American painting dated 1857, along with upholstery tacks. The thin, pointed shaft was formed by stamping a thin wedge through the head leaving a negative space. On the head was stamped KEUFFEL & ESSER CO. N.Y.

*Author's note:* The author wishes to thank George Fore, architectural conservator, for providing a number of articles and for his advice. Alexander Katlan also shared some data gathered by his Class of Advanced Examination of Works of Art at N.Y.U. Appraisal Studies.

**David Goist**

*Submitted October 2004*