470 - NAILS

470.1 - IMACS Classification: (NH) Nails - hand forged
(NC) Nails - cut (square)
(NW) Nails - wire/round

These divisions are based upon manufacturing techniques.

470.2 - Classification Descriptions:

1) Hand forged (wrought) nails: (technique of manufacture) - "The crudest kind of wrought nail was simply a piece of soft metal (eg. iron) hammered into nail form. The earliest nails were likely made this way. By the 18th century wrought nails were fashioned from metal plates rolled in rolling mills to the required thickness and then split by splitting-rollers into nail-rods or split-rods of various sizes, depending on the size and type of nail to be made. These rectangular rods of soft, malleable iron were then taken by nailers and drawn to a point by hammering. Heads were the untapered portion of the shank spread by clamping the shank in a vise and striking it with a hammer (Mercer 1924)" (Fontana and Greenleaf 1962).

2) Square cut nails: (technique of manufacture) - "Cut nails were made from rectangular strips of iron plate and tapered to a point by a single cut across the plate. The thickness and height of the plate determined the thickness and length of the nail, while the breadth of the nail at its head and point depended on the amount of taper applied in cutting and the strength of the blow used in forming the head" (Fontana and Greenlead 1962).

Attributes of hand forged nails versus square cut nails: "Regardless of size, wrought nails (hand forged nails) can readily be distinguished from square cut nails on the basis of the following features (Mercer 1924):

1) Wrought nails taper on all four sides of the shank toward the point rather than on two opposite sides as in the case of square cut nails.

2) Wrought nails vary in thickness throughout the length of the shank because of their having been hand forged; square cut nails exhibit uniform thickness because of their having been cut from a plate of uniform thickness.

3) Striations, minute parallel shear marks resulting from the shear of the cutting blade used to make square cut nails, are absent on shanks of wrought nails" (Fontana and Greenleaf 1962).

3) Wire or round nails: (technique of manufacture - a discussion of the methods of manufacturing wire nails is beyond the scope of this description -- see Scientific American (Anonymous 1903) for a discussion of manufacturing techniques.)

Attributes of wire or round nails: Wire nails are the common variety found today in this country.

470.3 - Chronology of Types:

For the purpose of dating nails Fontana and Greenleaf (1962:54-55) presents the following survey:

Pre - 1800: Nails were handmade, wrought nails, universally characterized by uneven rectangular shanks that taper on all four sides to a point. For certain purposes wrought nails continued in use until as late as 1850, and in isolated instances may have been made in the United States when square cut or wire nails were not available.

1790-1810: This period is characterized by machine-cut nails, the nail plate being reversed under alternate blows of the cutter. A few stamp-headed nails occur, but most are headed by a single hand-driven hammer blow. Angle-headed or L-headed nails made from headless nails also appear and continue in use until after the 1850s for use in floors and clapboards.

1810-1825: Machines are invented to make cut nails that obviate the necessity of having to turn the nail plate. Until 1825 such nails continued largely to be headed simply by being struck with a hammer.

1825-1830: Cutting of nails continues as immediately above, but water-powered machines are developed that head them automatically. The heads, however, are rather thin and lopsided.

Circa 1830-Circa 1855: Wire nails are invented in France (hence 'French nails') that are ground to a point and headed by hand. The first such nails are made in the United States by William Hassall (or Hersel) of New York City. They are rare in the United States during this period.

1830-Circa 1890: Cut nails are produced in machines that cut and head them uniformly. Heads are less thin, more uniform, and comparatively square. They are extra heavy on large nails. Cut nails in the United States during this period outnumber all other kinds with respect to both number and variety.

Circa 1855-present: Machines are invented in France to make complete wire nails automatically. A few are exported to the United States, soon to be replaced by machines of American manufacture. It is about 1890, however, before wire nails outnumber cut nails. Wirenails today are the common variety in this country.

Circa 1870-present: Cut nails are annealed to prevent their rupturing when clinched.

Circa 1890-present: Cut nails continue to be manufactured for special purposes, such as securing wood to cement, concrete, or plaster, until about 1950, when they were replaced by cement-coated nails. But, cut nails were still commonly found in sub-flooring for

hardwood floors. It was also probably early in this period that large cut nails were pretapered in rolling mills, the nails then being cut with parallel rather than diagonally opposing strokes of the knife.

Rocky Mountain Area Nail Chronology and Notes (from Buckles et al. 1978:438-440).

Prior to 1790, nails were hand forged. Invented about this date, machine cut square nails were widely in use by 1830, although hand forged continued to be used, particularly in frontier areas. Although introduced as importations of small nails in the 1850s, wire nails did not dominate the market until the 1890s. A general rule is that the larger the percentage of square cut nails, the older the site. Machine cut square nails are still manufactured for limited usage.

Many sites in Colorado were occupied in the late 19th Century during the transition period from cut to wire nails. Inferences from production figures of cut and wire nails cited by Clark (1949, Vol II:351-355 and Vol. III:125-127) indicates the rapidity with which wire nails replaced cut nails in availability. The first wire nail made in the United States was in 1873 but large scale production did not begin until the 1880s. By 1884 six manufacturer's were producing wire nails, although in 1886 'cut nails' were dominant. By the 1890s wire nail production far exceeded cut nail production as the following figures, cited by Clark (1949, Vol. III:125-127), indicate:

Nail Production in the United States

Year	Nail Type	Amounts
1886	Cut Nails	8,161,000 kegs
Wire Nails	No figures	
1894	Cut Nails	2,425,000kegs
Wire Nails	5,682,000 kegs	
1900	Cut Nails	1,573,000kegs
Wire Nails	7,234,000 kegs	

It can be postulated that since nail production averaged 8,000,000 kegs a year for the years cited, the great majority of nails available in 1886 were cut nails. A 'Rubicon' was possibly crossed about 1890 when wire nails were in the majority. This allows tentative dating for sites as follows:

1886 --- cut nails
1890 --- 50% cut, 50% wire nails
1895 --- 25% cut, 75% wire nails
Post-1895 --- greater than 75% wire nails

470.4 - Additional Notes Pertinent for Recording Nails (esp. as to function): (from Buckles et al. 1978:403-404)

Three functional classes of construction nails are defined which we believe to have some validity. Small construction nails are defined as 2d-5d and are used in the final stages of carpentry. Nails from 6d-16d are called medium construction and are used for most purposes. Large construction nails are those which are 20d or larger and are used for framing a house, fence construction, or similar activities.

Classifications of nails are according to the pennyweight system which is still in use today. This system of measurement is applied to both square cut and wire nails. It is recorded as 'd'.

Pennyweights of nails:

2d to 10 d are based upon 1/4" increments beginning at 1", (i.e., 1"=2d, 1-1/4"=3d, etc. up to 3"=10 d)

1"	= 2d	3"	= 10d
1 1/4"	= 3d	3-1/4"	= 12d
1 1/2"	= 4d	3-1/2"	= 16d
1 3/4"	= 5d	4"	= 20d
2"	= 6d	4-1/2"	= 30d
2 1/4"	= 7d	5"	= 40d
2 1/2"	= 8d	5-1/2"	= 50d
2 3/4"	= 9d	6"	= 60d

470 - NAIL STYLE BREAKDOWN

Figure 11. a-l, square cut nails, 1:1 scale; a, 8 d. finishing; b. 1 1/4" barrel: c, 3 d. fine blued; d, 7/8" tobacco; c. 12 oz. Hungarian shoc; f, 6/8" Hungarian shoc; g, 10 d. 3 " clinch; h. 40 d. common cut; i. 9 d. common cut; j, 8 d. fencing; k, 8 d. casing; l, 8 d. brad, m-r, no scale.. m. wrought iron nail, about 1800; n. cut nail with wrought head, about 1800-1825; o. cut nail with crudely-stamped head, about 1825-1830; p. cut nail with "L" head, about 1800, 1850; q. cross section of cut nail shank, about 1790-1810; and r. cross section of cut nail shank, about 1810-present.