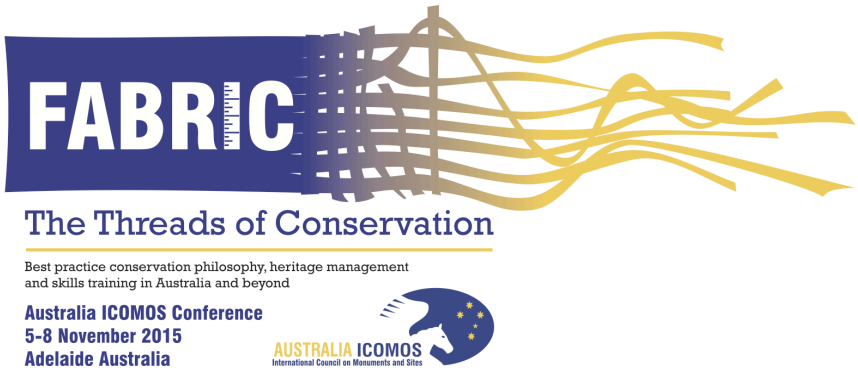
Revisiting Ewbank nails as aids to dating construction elements

Christopher Ian How

Proceedings of:



Revisiting Ewbank nails as aids to dating construction elements

The Background Context

At the time of the First Fleet there were no mechanically made nails available and nails were limited to four types: cast, cut, wire and wrought.

- Cast, the oldest method of nail-making, is lightly dismissed in passing by Diderot and d'Alembert; 'Les clous en fer se forge; les autres se fondent: la fabrication de ces derniers n'a rien de particulier; c'est un ouvrage de Fondeur tres-commun'. (Diderot & d'Alembert 1765).

  They are ignored by Roubo even though he provides much detailed information about wire nails (*Clous d'epingles*) (Roubo 1769). It would appear that references in English are limited to the various patent details and the closest mention made by Moxon is to do with the casting of nuts (Moxon 1703: 35, 38).

  In spite of the inference of the 'Grande Encyclopedie' that only non-ferrous nails were cast , iron cast nails appear early in Australia and have been found as lath nails in the Rum Hospital section of Old Parliament House, Sydney, and in early Sydney houses (Johnson 2013, Stapleton 2011). Finds of cast lath nails have been found in a datable context in Westminster, in the County of London, as far back as 1780 (Ayton 2007).

  It was the 1769 British patent by Jacob Ashton of Birmingham which resolved the problem of annealing small iron castings, and nails in particular (BPO 1769). Finds of these early cast nails go unreported yet they were certainly present in several forms from the time of first European settlement. The most likely sources would be as boot nails and brads, as hob nails for wearing surfaces and for the armouring of strong doors, cell doors etc. The ease with which decorative heads could be formed by casting resulted in cast nails being used extensively for coffin nails, for fancy furniture nails, and similar household fixings during the period of settlement and up till WWII (Moseley 1968: 31).

- Wire nails, from 6mm to 53mm long, were a standard product of specialised French workshops and included among them were two sorts; 'Men' and 'women':
  'Il y a parmi les clous d'epingle, ceux d' homme et ceux de femme; ils ne different que par la force; les premiers sont les plus forts' (Diderot & d'Alembert 1765).
  They were available in both brass and iron, and with cold formed flat or domed heads, but their common distinguishing feature were their ground conical points. There appears to be a total absence of reference to this type of production in British texts, yet examples of domed headed nails occur in their thousands, both on travelling chests, furniture and locks. Several domed head nails have shown up in pioneer buildings in south-eastern Australia but up to now these have all had square forged shanks. So far the jury is out with regard to early handmade wire nails from British sources.
- Wrought nails, formed the major class of nails used in construction up to 1845 or so, and for around 200 years they had been forged from appropriately sized nail rod. They could, in times of desperate need, be formed from bar iron. Vernacular nails, dating from the late medieval period, strongly suggest that local blacksmiths would make their own basic nail types by flattening pieces of iron bar into flat sheet and then cutting off narrow triangular slivers using a bolster or a 'hardy' chisel. The narrow elements could then be pointed and headed in an obore. Needless to say, all of those found to date indicate design faults such as turn-back of the points, and they tend to display unusually lop-sided heads (How 2015: 82).
- Cut nails in 1788 existed in several forms already, but apart from glazing brads, which were usually cold cut, were normally cut from heated flat strip. It has been shown that at 'black heat' (around 900 degrees) the shear force required was approximately half of that needed to cut the equivalent width and thickness from cold iron (Ryzewski & Gordon 2008: 57). In 1788, the blacksmith of HMS Sirius, then at Norfolk Island, was noted improvising shingle nails from barrel hoops (Varman 1993: 148). The

same technique was recorded in the following decade as being used in Newcastle (NSW) and in Sydney Cove, so it would seem to have been a common practice. Using a strip of a given width, the strip had to be turned over between each cut, prior to pointing and heading.

The problem of grain in iron ribbon

By curious coincidence the first patents for the mechanical production of nails were lodged on both sides of the Atlantic in the year 1790 (Edwards & Wells 1993: 16). Up until 1840 the Americans relied predominantly on water power and as a consequence their capacity to roll iron ribbon was restricted to narrow rollers. The British had been using steam power for rolling wider iron sheet from 1728 in order to make tin sheet and cylinders for tanks and engines etc, and a variety of items (such as buttons) could punched out of iron sheet. Sheet widths up to 900mm or so were common by 1790 (Hayman 2005: 56). The disparity in technological advance saw two of the early American inventors, Joseph C Dyer and Jacob Perkins, re-settle in Manchester and London, to benefit from the advantages offered by cutting nail strip from wide rolled sheet, (that is so the grain could then lay along the nail shank). A batten nail closely resembling the Dyer patent illustration of 1810 showned up in an early Portland pub, fig. 1.

Fig. 1. Dyer's 1810 patent illustration with an 1846 batten nail from Portland, Victoria. Author.

The disadvantage of the American home production method, (using narrow rolled ribbon), was that transverse cutting left the nail shanks with fibres lying across the grain, and hence the nails were prone to break (Edwards & Wells 1993: 13). We have the observation of the

American trader in Gold Rush Melbourne, George Francis Train in 1853, that the early American cut nails were distrusted by Australian carpenters: ‘Our American cut nails are not suited to the wood of this country, or it is of so close a grain that it breaks in being driven. Britain supplies a much better article. Ewbank’s pressed nail is much used and well liked’ (Train 1970: 25).

The Profiled ribbon initiative

Of the two nail-making patents lodged in 1790 by Thomas Clifford of Bristol one describes a different and ingenious solution. This was to re-roll iron ribbon to a profiled cross-section, like the profile of an aircraft wing, by having a flat bottom roller and a concave top roller. This produced a maximum width to the shank at the mid-point of the nail shank, and meant that the ribbon could be fed directly through the guillotine blade without the need to be flipped over between each cut. Several different variations of this type of profile have shown up in early nails from pioneer Victoria, fig. 2, with a variety of head shapes, some of which are obviously hand forged. This was the forerunner to a successful run of rather clumsy looking nails, one of which showed up in roof repairs last year in Garvoc, close to Terang in western Victoria, in a datable context of 1880, fig 2, bottom right. At the time of writing the earliest datable finds of the pre-profiled sheet nail have been in an 1843/4 context at Major Charles Newman’s bungalow ‘Pontville’ at Templestowe, east of Melbourne, which was recently investigated by Dr Roger Luebbers, fig. 2, top left (Luebbers 2014). The nails in this group show a single front face clamp mark which tends to be associated with manual heading using a quick-release vice. However, Luebbers also found similar nails displaying raised side ridges, much like Ewbanks. These may have been produced by the Ewbank makers’ competitors against whom, according to the company history, legal action was taken for infringement of copyright (How & Lewis 2009).

Pre-profiled cut cladding nails, with the same single front face clamp and a curious off-set head, were found in an 1853 context in Portland, Victoria, in two sizes and in some numbers. Some more conventionally headed ones from 1851 were found in Warrnambool and almost identical ones to these were found at Haddenham in Buckinghamshire, UK, of around the same date.

Fig. 2. Pre-profiled rafter nail 1843, Pontville, (Photo Dr Luebbers) and 1853 Portland, Warrnambool 1850, and Garvoc 1880. Author.

The Ewbank nail was later produced in a pre-profiled cut facsimile of its standard rolled form in the T-patent cut nail made by Cordes & Co.

Ewbank and Cordes

The Ewbank nail was initially made by a partnership of two brothers-in-law; James Cordes, a Yale educated American, and the much older Henry Ewbank, an Englishman of international background, under the registered name of J J Cordes (How 2009: 831). Their factory, called Dos Works in Newport, Monmouthshire, was built between 1834 and 1836, when production started. ‘Dos’ indicated that their venture was the result of a bequest from their wealthy American father-in-law, Jonathan Lucas, who had relocated to London from the Carolinas and had died there in 1832. The pair had worked together on several foreign ventures, including silver mining in Mexico and building tidal mills in America, prior to the family move to London (How & Lewis 2009: 831).

It was Cordes who took out the patent in 1834 for improved nail-making machinery (BPO 1836). It included 'stretching rollers', which imparted a similar resilience to the nails as is imparted by the forging process of extending the shanks out of nail rod. The ‘rollers’ (actually two eccentrically mounted arcs) moved down the red-hot nail rod from above and below between two side containing plates. Consequently Ewbank nails are primarily recognised by raised ridges to top and bottom edges of the shank. These distinctive ridges were caused by the rollers squeezing the heated nail rod into a new cross-sectional form as they advanced, spreading the lower section of shank laterally to touch the two, vertically mounted, containing plates. A built-in tolerance allowed the rollers to move freely between them by being narrower than the plate spacing. Hence the slender gap on either side of the rollers left a slight ragged ridge each side where the rollers had no effect. Due to the tight fit between the containing plates, the nail had to be ejected downwards from the machine by ‘fingers’ depressed from above, and these left tell-tale transverse marks on the upper shank. The nail shank itself was spread out by the rollers, widening it towards the tip resulting in an outward taper. However, the containing plates imparted slick side surfaces to the lower part of the shank, square to the horizontal axis, which can normally be seen on better preserved specimens, so the contained ends terminate in short parallel lengths.

In order for the nail rod to advance between each operation, an advancing gear engaged both sides of the rod leaving slight ridges on each side. These slight ridges disappear on the lower section of shank due to contact with the containing plates. The Ewbank nail, in wrought form, is possibly the only nail in the world to spread out towards its point, and one of the few nails to exhibit ridges down the length of the shank. These latter may not be visible to the naked eye but can be detected running forefinger and thumb down towards the tip. The ridges also greatly enhanced the withdrawal load capacity, particularly in hardwoods, and may be another reason behind its big success in Australia, and also in Britain where hardwoods continued to be used for construction purposes.

A mixed development

The Ewbank rolled nail was made in three identifiable forms in 1836, 1869, and 1881 respectively. Around 1870 a cut-nail facsimile called the T-patent was made from pre-profiled sheet. The first three mentioned were made from heated nail rod of rectangular section rolled by two eccentric arcs which squeezed the heated lower section of shank. All three of the wrought versions, of 1836, 1869, and 1881, display shanks which tapered outwards on plan, but thinned in side profile approaching the tip. In the first two versions the upper part of the shank was gripped from above and below prior to striking the head in the so called 'face clamping' method. This probably developed in America around 1811 but it took nearly three decades to become standard in their nail industry (Edwards & Wells 1993). Held thus a four facet 'rose' head was 'upset' under pressure, which also forced out side haunches which vary considerably in appearance from almost negligible to well defined 'shoulders' below the head, fig. 3, top two nails. The head dies were changed in 1869 to provide an overlaid trade mark, which consisted of a four pointed star, fig. 4. One of the disappointing things to be noted is that large numbers of Ewbank nails dating from after 1869 are found without this trade mark and, due to the extraordinarily large numbers, they do not reflect a simple depletion of old stock. It rather seems that many dies were changed for some time and the old head dies of four simple facets continued in use.

A factory history relates that Dos Works made cut nails during the whole of this period, including the spur-headed cut floor brads (How & Lewis 2009). Given this aspect of the business, and the later departure into the T-patent facsimile, it seems likely that some of the early pre-profiled ribbon cut nails, fig. 2, were being developed early in the 1800s. These pre-profiled sheet cut nails are relatively common in early Australia but firm contextual dates are rare, so readers are requested to look out for this early cut nail form wherever a context date can be established.

The private company and the Star trademark

Henry Ewbank resigned his position in 1853 to continue in the London export and rice business set up by Lucas. Nails were one of his main items of export exported to Australia and elsewhere, and they were sealed in iron bins in order that they would arrive in first class condition (Australasian Ironmonger, 1887). James Cordes bought out Henry's shares in JJ Cordes in 1869, and thereafter the star trademark was adopted. The business then became the private company of J.J.Cordes & Co.

Fig. 3. Wrought forms of Ewbank nails; 1836, 1869, 1881 and the cut form facsimile T-patent of 1870. Author.

The Heward patent square neck

The third form of Ewbank wrought nail of 1881 incorporated a new neck detail. A revised form of grip was adopted which had four sides which resulted in a square neck; even though the nail rod itself continued to be rectangular. This resulted in four haunches under the head, set on the diagonals, fig. 3 third nail. The new form of grip can be attributed to a factory employee, a James Heward, whose name appeared on the patent (BPO 1881). In other

respects the nail remained the same and used the star trademark. With a little practice, the absence of face pressing with its two primary haunches to be replaced by four minor haunches and square neck, can easily be made out. The nail no longer looked symmetrical but appeared to be 'lop-sided'. There was a bevel on the top edges of this square and a small breakout of metal at the corner gaps which produced four haunches on the diagonals; two primary haunches being slightly larger on one diagonal, and two secondary. The change from square neck to rectangular shank gave rise to an apparent twist in the tops of these nails. This form of square grip to the neck had already appeared in early iron wire nails and the factory's later venture into iron wire nail production may have directed Heward towards this resolution, which purportedly speeded up production.

Fig. 4 Ewbank heads; 1836, 1869, 1881, and the T-patent of 1870 with competitors' look-alikes. Author.

The T-patent cut facsimile

Heward, a Company employee, obtained four patents all told, one in 1870, one in 1878, and two in 1881. The 1870 patent document illustrates and describes the heading device to pre-profiled proto-shanks. The British had persevered with the pre-profiled ribbon concept as a way of avoiding the need to flip-over the hot ribbon between each cut, a process which was never abandoned by the Americans.

By 1840 American cut nail development had settled into an elegant and satisfactory solution, which was quite adequate so long as the nails were restricted to softwood use. The American aim was to resolve the below head weaknesses due to metal cramping and transverse fibres. This was done in a simple but technically clever way of rotating the proto-shank prior to

clamping. The rotation of the proto-shank through ninety degrees resulted in ‘face clamping’ which enhanced the elegant appearance of their cut nails, Fig 5, first nail. This was the solution used by Cordes and Ewbank who both had excellent contacts with North America. With minor changes the face clamping solution was again used to good effect by Heward to perfect a final developed form of facsimile, the T-patent in which the pressing forces were applied through two sections of ‘arc’ front and rear. The Americans adopted discernible bevels to their cut nail edges. In both cases the pressing ran down about 45% of the shank length below the head. The British cut clasp nail continued to use side clamping, fig. 5 second nail (How 2014: 234 – 236).

Fig. 5. An American ‘fine’ face-clamped cut nail of 1877 from Warrnambool & a British side-clamped cut clasp nail of circa 1856 from Coleraine. Author.

Cordes’ cut steel nails

In addition to the T-patent, which had a later steel version in which the head and haunches became tighter and which diminished in size, the Company developed a new range of cut steel nails for which it adopted a new ‘back-to-back C’ trademark. These have shown up in British sources and may yet occur in South Australia where British nails predominated for a longer period.

Fig. 6. Cordes steel cut nail trademark (Ironmonger Diary 1924) with unused samples. Author.

Summary of identification features

The wrought versions of 1836 and 1869 can display up to seven shank features:

1. Raised ridges on either edge of the nail shank left by the rollers occuring to both top and bottom surfaces. These are best detected by tactile feel between finger and thumb.
2. Faint swelling on each side of the nail shank, like a low ridge, between the nail haunches and the slick parallel final end of the shank, from an advancing device which gripped the hot shank on each side.
3. An even tapering of the nail shank when seen in side view for about 60% of its length towards the tip. Conversely, a plan view shows a widening towards the tip over the last 50% or so and for about half of this distance the sides are slick and parallel.
4. Opposing, slightly convex, flat surfaces, form the clamp imprints. These are set at a slight convergence towards the underside of the head and finish with a small 45 degree bevel. The flat surfaces occupy around 20% of the shank length below the head.
5. Two non-intersecting cuts form the spade end with a slight ragged fracture in the middle.
6. Up to three transverse, half round indentations across the shank towards the head end which are the ejection finger marks. They vary in position, and are frequently very faint.
7. Semi-rounded haunches on each side under the head, which are rarely equal in size as the head is often struck off centre. Nails made around 1880 have a more concentric head alignment than earlier ones.

Head features

These comprise essentially same four facets on all of the wrought versions, excepting that the trademark four pointed star, similar to a NATO star, is superimposed after 1869. On rare occasions it is possible to find an 1836 original version which shows a small pimple at the intersection of the four facets to the head although this is usually obliterated. Other features to look out for are:

- Early version heads are quite often struck well off the shank centre line.
- The heads have irregular edges and tiny breaks to the head perimeter. Later versions, particularly after 1881 have a more regular head and show far less perimeter break-out.

The T-patent

This may have appeared about 1870 and unlike the wrought versions it was made from parallel cut blanks sheared from off a profiled rolled ribbon. There are distinctive shear marks to the cuspate sides suggesting great pressure was used both in cutting and then in face clamping.

The essential features are:

- Both top and bottom edges on both sides curve down, and no shear burr is visible.
- The two sides are both cuspate.
- The top and bottom faces are both slightly convex.
- The cross-section is not always a symmetrical rectangle but often slightly trapezoidal.
- The head tends to be more regular with an even perimeter and with no edge break-out.
- The haunches are modelled on the early Ewbank nail but are more regular and symmetrical.
- The tip chisel point is square and blunt.

References

Australasian Ironmonger. 1887. April 1st Trade Notes. Sydney.

Ayton. R. 2007. City of Westminster. Personal communication.

British Patent Office. Patent no. 1762, 31 July 1790 & patent no. 1785, 30 December 1790.

British Patent Office. Patent no. 3365, Patentee J. C. Dyer, enrolled January 1811.

Diderot, D, ed, 1751-1780: *L'Encyclopedie*. 35 vols, Paris. Denis Diderot.

Edwards, J. and Wells, T. 1993. *Historic Louisiana Nails*. Baton Rouge. Geoscience Publications.

How. C. & Lewis. M. 2009. *The Ewbank Nail*, in Karl-Urgen Kurrer et al. (Eds), *Proceedings of the Third International Congress on Construction History,* vol. 2, Cottbus, Germany).

How, C. 2009, *The American Cut Nail*, in Lewis, M. ed. *The Pacific Connection*. Proceedings of a seminar at the University of Melbourne. Melbourne.

How, C. 2014, *The British cut clasp nail*, in James Campbell (eds.), *Proceedings of the First Conference of the Construction History Society*, Cambridge.

How, C. 2015, *Early Steps in Nail Industrialisation*, in James Campbell (eds.), *Proceedings of the Second Conference of the Construction History Society*, Cambridge.

Johnson. S. Personal communication.

Loveday, A. 1983, *The Rise & Decline of the American Cut Nail Industry*. Westport (Connecticut). Greenwood.

Luebbers. R. 2014. *Major Newman's Pontville: Fabric Analysis & Archaeological Investigation of an Early Colonial Homestead,* Templestowe. Report to Parks Victoria.

Moseley. A. 1968. *The Nailmakers* Journal of the West Midlands regional studies. Wolverhampton Polytechnic. British Library

Moxon. J. 1703. Reprint 1970, *Mechanick Excercises.* Praeger. New York

Ryzewski. K. & R. Gordon, 2008. 'Historic Nail-making Techniques Revealed in Metal

Structure', *Historic Metallurgy*, vol. 42.

Roubo. A. 1769 *L'Art de Menuisier.* 1976 re-print, Léonce Laget, Paris.

Stapleton. I. Personal communication.

Train, G.F., ed. Potts, E. 1970, *A Yankee Merchant in Gold Rush Australia: Letters of 1853-1855*. London.

Varman. R. 1993. *Bricks and Nails: Building Materials as Criteria for Dating in Sydney and Environs from 1788.* (Unpublished thesis, University of Sydney).