

## Architectural Forensics: establishing a date for the construction of Pavitt Cottage, Robinson's Bay, Bank's Peninsula

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**ABSTRACT:** Many early New Zealand properties and indeed colonial-made artefacts often lack detailed documentation, provenance and in some cases, any known or relevant history. It is possible to establish new information by analysing the wide range of materials used to build even a modest cottage. Further, it is possible to establish a likely time-frame of construction by looking at improvements in the manufacturing of various imported components. Already known facts can be incorporated with newly-recovered information to provide a broader historic picture. As with archaeology, one object can be used comparatively to determine likely probabilities from other sites.

Pavitt Cottage, at Robinson's Bay on Bank's Peninsula was built sometime between 1857 and 1862 with additions in 1865. Local records have been unable to provide a more accurate date. Within the last 15 years it has been "restored" with the potential loss of some useful evidence. This paper will illustrate how it is possible to glean new knowledge from the materials used to try to establish a precise date of construction.

"The problem that we are engrossed in is how to establish whether an extant cottage in Robinson's Bay, Banks Peninsula was built by the Pavitt Brothers in 1857-8 or by Thomas Jackson Hughes in 1860-61."  
Helen Leach<sup>1</sup>

### Overview

Pavitt Cottage [built c1857-62] is a small weather-board dwelling of conventional colonial character originally having a roughly square footprint and with a later c1870+ two room wing to the north-east rear side. The older front portion has a 2x2 room ground-floor plan with two small bedrooms upstairs in the peaked roof cavity. Likely there were once three rooms as indicated by a redundant door off the landing on the south side. There is a full-length verandah across the front of the house with the front entrance door



**Figure 1:** Pavitt Cottage, Robinsons Bay, Banks Peninsula built sometime between 1857 and 1862. The newer 1870+ wing is just visible to the rear.

opening directly into the drawing room. Although steep, the shingled front roof covers the front porch area without break or change

in angle. To the rear this does occur to maintain sufficient head room for the [deeper] kitchen. The appearance is of a "lean-to" but is

<sup>1</sup> Leach to Isaacs p [1].

integral to the original 1857+ structure. The slightly later c1870+ rear wing runs perpendicular from the older part to the east.

### Timber Milling

A watercolour looking west out to sea with the cottage in the middle foreground, assumed to have been painted c1870, does not show the later east wing. From this rear point of view and to the left of Pavitt Cottage is however depicted a saw mill and water wheel beside a stream. This was the second mill on that site. The first mill built certainly by 1854 was destroyed by fire and was apparently the oldest operating in Canterbury. As Henry Sewell's journal of 26th February 1855 records: "Since I was there last a Saw Mill has been set up in one of the bays and a man and his seven sons, stalwart youths are earning according to their own account £100 per Month."<sup>2</sup> He referred then to John Pavitt and seven of his eight sons at Robinson's Bay. Samuel Farr helped the Pavitt's construct this first mill and in 1900 wrote an account of it. Farr initially constructed a model:

I began the pattern at once, and made the frame complete, then formed and fitted the machinery. Having a lathe I turned the wheels out of dry kowhai, and formed the cogs out of the solid. When it was complete

<sup>2</sup> [21 February 1855] *Journal of Henry Sewell 1853-7* II:132

the model worked to our satisfaction, cutting by hand power small pieces of wood very truly. The saw was a vertical one, tightened in frame by screws of my own make. This success so far was encouraging.<sup>3</sup>

The full-scale saw was then constructed with an 18-foot diameter wheel with three-foot wide water buckets.

The gudgeons, rings, and pillow blocks with brass bearings came from Sydney, and everyone who saw the wheel called it a perfect model.<sup>4</sup>

The mill operated successfully until destroyed in a bush fire. Possibly that may have been in 1854 based on a drop-in shipments of timber on the Pavitt's own ship, *Seabird*, as recorded in the *Lyttelton Times*.<sup>5</sup> Alternatively, as no timber shipments were also mentioned between July 1857 and August 1858, this period should also be considered. The mill was re-built and fitted with a 24-foot diameter wheel and advertised for sale as nearly new in the *Lyttelton Times* on 1 December 1860.<sup>6</sup> It was acquired by Thomas Hughes who transferred circular saws to the site that same

<sup>3</sup> Farr "Peninsula and Plain: 1840 to 1851" p 56.

<sup>4</sup> Farr "Peninsula and Plain: 1840 to 1851" p 57.

<sup>5</sup> Leach & George "Where Was The Pavitt Mill in Robinson's Bay?" p 7.

<sup>6</sup> "To Capitalists, Merchants, and Others [advertisement]" p 5.

year and by 1865 the mill was owned by Frederick Williams and George Saxton. It was Saxton who extended Pavitt Cottage shortly after 1870. There had been a dispute over road access, and a misinterpretation of land entitlement by Pavitt, and Pavitt may well have removed the machinery before Hughes took possession. Pavitt may have changed to a circular saw model following the fire.

### Exterior Weather boards.

An examination of the exterior wall boards to the oldest part of Pavitt Cottage clearly shows they were cut on a six-foot circular saw. However, several of the lower tōtara weather boards to the southern wall are slightly narrower in width and appear to have been vertically cut.

Much evidence is obscured by later paint layers. It is possible that these apparent pit-sawn boards with their irregular vertical kerf impressions are in fact marks from the vertical or reciprocating saw of c1854 as described by Farr. The nail patterns appear consistent to both board types indicating they are contemporary. Access to the (oldest) house studs was gained through the front ground floor bedroom cupboard below the stair case. The internal vertical wall framing [kahikatea]

appeared also to have been processed on this same six [?] foot circular for the earliest stages of the cottage's construction.

### Interior Timber Processing to Original Dwelling

All interior show-wood surfaces indicated hand planing and finishing. Panelling to the front reception parlour room exhibited very slight diagonal "gouges" clearly indicating coarse set smoothing plane marks. This is the signature mark left by the hand finishing of timber to remove saw kerfs and would usually only occur when no machine dressing was available. We could conclude an economy of hand labour left the painted exterior "un-dressed."

The same [machine] saw impressions again were found in an original built-in tōtara cupboard by the parlour fireplace again indicating that wood was circular sawn when the house was first constructed. Further, the moulding profiles [door panels and capitals to fireplace] matched exterior window framing and wall panelling indicating same period manufacture.

There seems little doubt that a significant amount of timber was hand finished in the

older 1857-62 part of the property. More assertively, it can be noted that only machine-planed timber with its distinctive repetitive ripple patterns was found in the later 1870+ wing. By inference mechanised moulding was available for that later addition as well ... certainly sometime after 1865, when Saxton and Williams converted the mill to steam.<sup>7</sup>

### Mouldings

The entire interior decorative treatment is limited to the varied and imaginative use of merely five moulding profiles to create the widest decorative effect. Some internal joinery was complex and demonstrated a high proficiency of hand work and familiarity with wood skills. Cabinet-makers often had as many as 20-30 different moulding planes but carpenters had far less. This hints here to a carpenter with a small kit of planes dedicated to decorative treatment for house building.

### Windows

The windows are mostly small multiple pane [between 6 & 15] side hinged patterns. This style can be commonly documented to the first years [1850-51] of Canterbury settlement and to other regions from as early as the



Figure 2: Hand moulding plane made about 1840 with a Grecian ogee profile as used on Pavitt Cottage.

1820s. Period accounts frequently refer to "pre-made & glazed" windows of Pavitt Cottage style being imported ready for installation.<sup>8</sup> Most windows appear to have been replaced during recent "restoration" however one in the larger north facing upstairs bedroom is original. The internal frame is of native timber and is likely rimu or tōtara. This suggests that all windows were

<sup>7</sup> Cottrell *Furniture of the New Zealand Colonial Era* p 418.

<sup>8</sup> Cottrell *Furniture of the New Zealand Colonial Era* pp 21, 48, 51-52 147, 170.

once of local manufacture. These windows are consistent with many contemporary Akaroa houses and it reasonably follows that there was a local joinery workshop engaged in the manufacture of such house components.

Minor variations to the profiles of the astragals or glazing bars appear to be consistent with the use of "hollow sash," in this case an elliptical ovolo moulding plane. It is laborious and unlikely to have been performed if a mechanised spindle moulder were available. The extensive use of Grecian ogee mouldings for external and internal window framing is both consistent with period patterns and the limited number of moulding planes typical of immigrant carpenters. This assertion is further supported with the same moulding being used for internal fielded wall and door panels as well as door framing.

### **Tongue and Groove**

Most doors, interior roof linings, scotias and [exterior] barge boards are characterised by half-round reeds or bead edge mouldings [ $\frac{3}{16}$ " and  $\frac{3}{4}$ "].

It was not apparent if all these boards had been hand planed because of multiple paint

layers. It was however noted that the vertical T&G door boards were hand dressed and this would certainly mean that the "bead" was hand planed as would have been the interlocking T&G joins between boards. This extensive hand work needs to be considered along with the introduction of the first mill in the district. Simply, no-one would hand work huge quantities of timber if the machinery was available. The formation of a single T&G&V or bead board requires three hand planes.<sup>9</sup>

### **Doors**

A door to the upstairs [smaller] south-eastern bedroom was examined. The unvarnished T&G timber was kahikatea and is extremely prone to wood worm infestation. That door had never been painted nor varnished and no later interference, such as sanding, was apparent because of the sharp edges to the worm holes and evenly oxidised nail heads. There was slight gouging to the wood surface again demonstrating that those boards were hand planed and we must assume that the bead was also hand planed. Further evidence of hand [pre-mechanisation] processing of show-wood was found in the same door's top

cross member with haphazard smoothing plane strokes. It was just possible to discern small nicks in the carpenter's plane blade. On a mechanical planer or thicknesser these would appear as long parallel raised lines down the length of the board.

Separately noted was a "short" cut T&G board to the door indicating the doors were made on site and not in a joinery workshop. The varying board widths strongly imply pit-sawn timber and not the regular dimensions of factory milled stock.

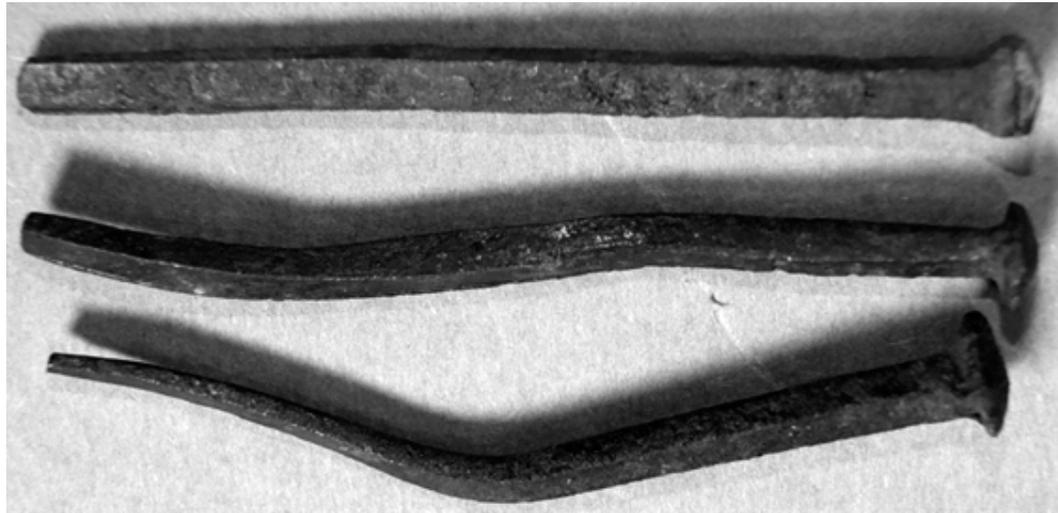
Comparison between doors of bedrooms in the earlier front and later post 1870 rear wing showed that there were no identical common constructional features. The "newer" door cross-members did not have the signature bevel found on those of the older part of the house. Additionally, the later door frame mouldings were completely different with no ogee and the introduction of a half-round moulded bead uncharacteristically used. The timber stock was of a uniform dimension unlike the front older bedroom door.

### **Skirtings**

The skirting board to the front downstairs original bedroom offered yet one more profile; in this case an astragal ogee. Although now in

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<sup>9</sup> Goodman *British Planemakers from 1700* pp 30-40.



**Figure 3:** The two patterns of Ewebank nails recovered from Pavitt Cottage. (top & middle: 1834-1869 with bulbous taper on one plane and burrs caused by parallel rollers; bottom: c1850-1860 tapering on all four sides produced by converging rollers [head pattern · × · ])

poor condition and much over-painted, there was sufficient evidence to indicate that this moulding was created by a hand plane. The shoulder [rebate] variations indicate that the carpenter altered the "spring" or angle that the plane was held at as they worked down the long board, i.e. they tilted it at inconsistent angles to create a wandering shoulder. Interestingly this is not a typical use for this ogee profile as it is really designed for making window glazing bars. Period skirting is usually far deeper with a more complex profile. It is therefore harder to make by hand

requiring an expensive and dedicated plane, some of which can be 3"-4" wide. This is the same as for stair hand-railings. It makes little difference what shape cutters are used when powered by machine as they far more efficiently remove the waste timber in as little as one pass.

#### Wall Paper

A small sample of original wall paper was preserved at the top of the stairs. It was a two colour [blue and light grey block printed "Moorish" diaper pattern with a 2" [50mm]

repeat. This style, popularised by Owen Jones' influential 1856 *Grammar of Ornament*, was laid directly over the rough sawn lining board. A small cupboard in the parlour was lined with a newspaper dated May 1901. It was noted and should be preserved of course, but well post-dates the period of initial construction interest.

#### Hidden Lining Boards

Evidence of original circular sawn kahikitea timber was found under the wall paper on the upstairs landing. The arc or curvature of cut was likely again to be from a six-foot breaking down saw. Those boards had a "waney edge" meaning they have been cut from the outside of the log [low grade and sappy waste-wood] and it is obvious they were never intended to be seen. These lining boards had been attached with sheet-sliced nails as found throughout the rest of the house.

#### Nails

Nails can indicate time-frames of manufacture and subsequent periods of likely use. Nails recovered from Pavitt Cottage are of sliced and stamped or sheet cut types. They conform to the "Ewebank" pattern and none were found to have that maker's characteristic post-1869 *star* impressed on the head.

Two head patterns were noted to the largest nails. One removed from the interior of the front downstairs bedroom cupboard had irregular faceted head consistent with the earliest Ewebank nail pattern dating from after 1834. It had [machine] ejection finger marks to the upper shaft below the head while the shaft middle had the typical Ewebank bulge. The head had compression fractures indicating it may not have been red hot and lost some plasticity while being forged. Most importantly it had raised ridges to top and bottom edges of its parallel sides caused by eccentric rollers on the "patented" milling machine squeezing and elongating the heated nail rod into a new cross-sectional form. Historian Chris How has surveyed early Australian buildings and notes that: "Miles Lewis ... has located Ewebank nails as far back as 1837."<sup>10</sup>

The second nail retrieved on this survey was found in the attic part of the newer wing and had consequently degraded more because of damp. There was an unidentified "Dot X Dot" impression to its head and had a regular four-sided tapering shaft. Another development of Henry Ewebank's was a machine with

converging rollers to draw out the nail and taper it to a point.<sup>11</sup> There were clear impressions of machine stamping to form the nail head as can be seen from the folded metal under the nail head. They are on diagonally opposite "corners" of the nail shaft suggesting two <> shaped vice heads gripping the nail as the head was hammer formed in a mould.

How and Lewis' following statement provides yet more information to the manufacture of the fully tapering nail:

Several types of nail cut from pre-profiled sheet[s] show up in buildings in Victoria's Western District [Australia] built around 1850. The nail shanks are cut from across the shaped sheet and then separately headed, following the usage of American separate heading common in America until the 1830s. ... Since this was the principle of the later Cordes and Co T-patent nail, it is possible that they were already attempting to develop a more cheaply produced cut nail, like the Americans, but with a shank strong enough for use in hardwoods.<sup>12</sup>

Nail profiles found in Pavitt Cottage only broadly agree with How and Lewis' timeframes but dates for their earliest patterns [pre-1869 star head] can only suggest an outer time frame for construction. Patents for machines only indicate an absolute

production start point and older machines will naturally have been kept in use long after they have been superseded by newer inventions.



**Figure 4:** Screws all recovered from one door hinge. (left: Pointed Nettlefold pattern 1854-58; right: Whitworth post 1834 pattern)

### Screws

Screw patterns are a very good indicator of age. Four were randomly removed from a black, cast-iron butt hinge. They were extremely informative and supported the time-line evidence in wood processing already discussed. Two screws had blunt tips, non-tapering shafts and deeply cut, very sharp

<sup>10</sup> How & Lewis "The Ewebank Nail" p [2].

<sup>11</sup> How & Lewis "The Ewebank Nail" p [3].

<sup>12</sup> How & Lewis "The Ewebank Nail" p [6].

threads when compared to the other two shorter [later] screws. The two types were made quite differently, most significantly in the way the thread was formed.

The blunt-tipped screws had their threads cut on a die which was wound onto the blank screw rod, rotated to cut the thread. This is quite evident where the metal has been pushed sideways by the cutter's pressure to create a double lip to the initial thread. Joseph Whitworth patented his un-locking clasp nut for forming threads in 1839. The advantage was that it did not need rewinding back down the threaded screw shaft. Its use was commonplace when he displayed it at the 1851 Great Exhibition. This "blunt" screw pattern is typically English and can be found in New Zealand furniture until the middle to late 1850s.<sup>13</sup>

The metal on all four screws has been squashed while hot causing the thread to rise beyond the original extruded rod blank diameter. In 1847 New Yorker Thomas Sloan patented his machine for forming pointed screws and in 1854 Englishman John Nettlefold bought the rights to manufacture those screws from Sloan's invention. By 1858

this machine was further improved to fully taper the screw to the more familiar conical shape.

The pattern of the two "pointed" screws followed the American model. Their counter-sunk heads were angled steeper and the slots wider. Interestingly they had a rounder outer flange as though they were not entirely tool cut on a lathe but possibly stamped. No chuck or grip marks were seen on any screw upper shaft perhaps implying more automation.

The important point to note is that those two screws tapered to a point quickly rather than the "slow" progressive taper of slightly later made screws. These are in fact the first totally machine formed pointed pattern screws. It is clear that both screws [blunt and pointed] were available during the construction of the initial stages of Pavitt Cottage. The former [blunt] screw type necessitated the carpenter to pre-drill the guide hole to the entire screw length and to the exact diameter of the thread trough. The "pointed" screw could drive its own thread once it engaged in the guide hole which could be started with a simple awl. A faster and simpler process. The screws identified for this study from the older part of Pavitt Cottage were all manufactured before

1858.

### **Hinges**

Cast and hand-forged hinges were found in the older and newer parts of the cottage. Windows and cupboard doors were fitted with patent [but commonly available] cast-iron butt patterns.

The IZONS & Co, West Bromwich, London 1840 pattern book illustrated a selection of just such hardware. Similar hinges have been identified in Canterbury cottages from as early as 1851. Much later iron founders Clarke & Co marked their 4" butts with "Silver Medal Paris 1878" but were otherwise indistinguishable from IZONS'. All ground floor doors were hung with smith-forged "cottage" or "strap" hinges. These cheap English "sheet-folded" patterns, with their familiar hammer flared tips, showed many irregularities consistent with hand forging. Although of similar design and manufacture, the "cottage" pattern hinges to the older and newer wings were clearly made by different blacksmiths. All were now over-painted but were once popularly japanned black.

### **Locks**

A small cupboard to the right of the fireplace

<sup>13</sup> Cottrell *Furniture of the New Zealand Colonial Era* p 429.

in the front parlour was a cheap and common mid-nineteenth-century japanned-pattern reversible cupboard surface-mounted pattern. It was crudely mounted with wire nails and that alone would indicate that it was fitted well after the door was constructed. The crude manner in which it was attached further indicated it was not by the original maker of the door. An Auckland made chiffonier, dated to September 1856, has a similar lock but this generic pattern was still available by the 1880s.<sup>14</sup> Three original "No.60" patent door rim locks by prolific Willenhall locksmith James Carpenter can be found in the oldest part of the cottage. Importantly these locks carry the pre-Victorian "WR" [William Regis] Royal Letters patent stamp of William IV who had died by 1837.

Carpenter originally patented his legendary "No.60" rim lock in 1830 and it was still in production until World War I. Carpenter had however died in 1844 and his son John subsequently formed a partnership with James Tildesley and the company name changed then to Carpenter and Tildesley. This appears to have happened as early as 1845.<sup>15</sup>

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<sup>14</sup> Cottrell *Furniture of the New Zealand Colonial Era* pp 268, 435.

<sup>15</sup> Tempest "Victorian Locks and Locksmiths" n.p.; Evans

The "WR" patent stamp implies a still valid patent and the pre-Tildesley name-plate does strongly suggest that the lock was manufactured in the 1840s. It would be difficult to argue that one of Willenhall's largest lock manufacturers had not changed their brass name-plate by the late 1850s. The lock mechanism has a high level of hand work with rough castings consistent showing no evidence of machining. The brass ornamentation to the striker plate further supports this observation.

This entry below was written in 1873 is from [*Samuel*] *Griffiths' Guide to the Iron Trade of Great Britain*.

Mr. Carpenter was the first to introduce rim iron into the construction of locks, but his name is better known as the inventor and patentee of the perpendicular motion in the working of lock bolts, the use of which has now become almost universal. The Summerford Works give employment to 150 pairs of hands, besides out-workers, and the average production of locks ... is something like 250 dozens per week. Of these the greater proportion are exported to the **colonial** and other foreign markets.<sup>16</sup>

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"A Gazetteer of Lock and Key Makers" n.p.

<sup>16</sup> Griffith quoted, Parker "Willenhall Through the Ages" n.p.

## CONCLUSIONS

1. Timber processing and tool marks indicate mechanical sawing common to both older and newer parts of Pavitt Cottage. It is known that by 1860-61 circular sawn timber was available but it may well be that after the first mill burnt down it was converted much earlier in either 1854 or 1857.
2. Pit-saw/vertical saw marks on lower exterior weather boards to the older front part of the structure indicate a transition between two forms of timber processing.
3. Only hand tool marks for mouldings and smoothing to surfaces were found to the older part of the cottage indicating a very simple milling operation most likely before the Hughes conversion in 1860-61.
4. Mechanical planer marks were only found to the interior lining timber of the later 1870+ rear wing.
5. Wall paper was popularised by 1856.
6. All hinge patterns well span either side of the 1857-62 Pavitt Cottage construction date and certainly were commonly found by 1857.
7. Screw types to the older section indicate patterns that would not have likely been made after 1858 and probably at least a year or two before, i.e. between 1854-58.

The mix of the much earlier blunt tipped pattern to secure the same butt hinge plate strongly imply that new pointed stock was only just becoming available. This points to a date closer to 1854.

8. Nail patterns indicate manufacture between 1834-69. Howe implies the regular tapered [unidentified] pattern could have been made as early as 1850.
9. Locks by James Carpenter are marked with the pre-1837 "WR" patent letters. Carpenter's company became Carpenter & Tildesley by 1851, but the *Birmingham Trade Directory* lists this name change as early as 1845. This places the locks well before the earliest 1857 construction date.

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