5.02 Timber Processing

tools
pit sawing
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markings

tools

Australian hardwoods were unfamiliar to British settlers, and there were problems even in cutting down any of the more durable trees suitable for building. Governor Phillip complained from the first that 'bad tools are no kind of use',[1] but the problem may have been as much that the Australian timber was so much harder than the British. Four years on, Phillip was still asking for saws and axes, as those from England had worn out, and some attempts were being made to forge tools from scrap iron, but with very little success.[2] In Van Diemen's Land in 1817 William Thornley tried to cut down a tree using heavy broad axes which he had brought from England, but had much more success with the 'camp axes' which he bought in Hobart, and which were 'much longer in the handle and narrower in the blade', though it is not clear where they were made.[3] Even in 1841 James Allen of Brownhill Creek, South Australia, wrote 'Few axes that are sent here will stand against our wood, without being re-hardened'.[4]

By the 1820s distinctive local tools had begun to develop, and Peter Cunningham stated that[5]

> Edge tools require to be particularly well tempered to withstand our hard woods. Our felling axes are long and narrow, to penetrate our iron woods more readily, and with one somewhat larger and narrower still, the mortices are cut in the posts.

This implies that axes different from the English standard were used, but it may be that this was a question of selecting one of the less usual English types rather than redesigning the implement entirely. Robert Irving has explained that the English felling axe, though unsuitable for the job, remained the norm in Australia until the American axe was imported, probably in

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1 Morton Herman, *The Early Australian Architects and their Work* (Sydney 1954), p 4, citing *Historical Records of News South Wales,* I, part II, p 556.
2 Herman, *Early Australian Architects,* p 4, citing *Historical Records of News South Wales,* I, part II, p 643.
3 William Thornley [ed J S Mills], *The Adventures of an Emigrant in Van Diemen's Land* (Adelaide 1973 [1840s]), pp 40-41.
4 Colin Kerr, *'An Exelent Coliney'* (Adelaide 1978), p 130.
5 Peter Cunningham, *Two Years in New South Wales* (2 vols, London 1827), II, p 165.

the 1860s.[6] It may have been somewhat earlier than this, for in New Zealand George Earp wrote in 1853 that carpenters:[7]

> should always have a good assortment of tools ...
> .. make a selection of American axes, all others are of no use ... the timber of New Zealand will try the goodness of the best article.

A German observer commented that the American axe would fell and smooth logs in the same number of hours as the German axe would require days.[8] It was likewise superior to the English one, which had a large but light head, a straight cutting edge, straight tapered cheeks and a straight short handle. The American axe, 'a steel version of the Red Indian axe', had a small, heavy head with fat cheeks and a curved cutting edge, and a long tough hickory handle which could absorb shock: it was swung wide and thrown into the wood, whereas the English axe was used like a chopper. Late in the century settlers in the Goulburn Valley used an American axe called 'The Sharp', made by the Douglas Axe Co, and this gave rise to an idiomatic expression 'swinging Douglas'.[9]

By the 1890s the Douglas and other American brands such as Sharp, Plumb, Underhill, Hubbard, Chopper's Pride Mam, and Lippincoat, had largely displaced English axes such as Elwell and Gipin. In axemen's competitions Plumb and Underhill proved the best, and by 1892 most competitors favoured the Underhill bronze coloured axe. Local blacksmiths were themselves making improved axes, and the United Axemen's Association invited axe competitors and manufacturers to submit ideas for the best axe design. Agreement was reached that the ideal was a blade $5^1/_4$ to $5^1/_2$ inches [134-141 mm] wide, a total depth of $7^1/_2$ inches [192 mm], a half inch [13 mm] pole, a width at the handle of $4^1/_2$ inches [115 mm], and a total weight of six pounds [2.72 kg]. Four American companies, but no British ones, were able to supply this. By 1897 90% of competitors preferred American axes despite a general belief that the British ones were of higher quality manufacture.

In 1898 the English company Brades took an interest, and sent out specimen axes, which were judged to be the best yet seen. Brades then sent out a case of axes for the International Wood Chop and Sawing Competition in Tasmania in 1899 and won the competition, notwithstanding the fact that the American Axe and Tool Company had produced their Hollow Concave Axe in January 1899. This company had by 1902 acquired many of the other American manufacturers.[10] This was the process which

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6 Robert Irving, 'The First Australian Architecture' [MArch, University of New South Wales 1975], p 187, citing Cox & Freeland, *Rude Timber Buildings* [], pp 14, 15 (which seems irrelevant); Mary Gilmore, *More Recollections* [], pp 145, 146; Ketteridge & Mays, *Five Miles from Bunkum* [], pp 106, 107, with a comparative illustration of axe heads from Ralph Hodgkinson, *Tools of the Woodworker* [technical leaflet No 28 of the American Association for State and Local History].

7 G B Eap, *New Zealand Emigration and the Gold Fields* (London 1853), quoted in C P Murphy, 'The Fencible Cottage: Soldier Housing' (MArch, University of Auckland, 1995), p 73.

8 John Fitchen, *Building Construction before Mechanisation* (Cambridge, Massachusetts, 1986), pp 136-7.

9 J K Andrews, 'History of Merrigum' (manuscript, Merrigum [Victoria] 1954, copy supplied by Anne Tyson 1997), p 27.

10 Val Quanchi, 'World Competition to Ascertain the Best Saw and Axe', *Tool Chest*, XI, 1 (February 1999), pp 25-9.

established the form of the 'Tasmanian Axe' as manufactured for many years afterwards. Soon John Danks of Melbourne advertised Plumb's, Collins and Brades (Cockatoo brand) axes in the Tasmanian pattern, each in seven weights from 4 to 5½ pounds [1.82 - 2.50 kg].[11] In 1949 McPhersons of Melbourne were similarly advertising Plumb's Tasmanian Pattern, Kelly Dandenong Tasmanian Pattern and Brade's Cockatoo axes.[12]

Not merely felling axes, but other tools as well had to be adjusted to the hard local timber. According to Peter Cunningham:[13]

> The common English sale gimlets are either soon broken at the point by our woods, or else the handle becomes loose. The best method is to file off a portion of the screw, sharpening the remains to a point, give the gimlet a half turn backwards every bore you make, and clean it frequently. Centre-bits are by far the most expeditious, however, and a dozen sets each of bits for boring nail-holes of all sizes ought to be taken out.

The inadequacy of the tools available, and the initial lack of understanding of the local species, delayed the adoption even of practices which were common in Britain. Even weatherboard cladding, widespread in Wales, Kent and Sussex,[14] made only a belated appearance, as will appear below. Nonetheless, most tools were of standard overseas types, mainly British at first but increasingly American as time wore on. Cross-cut saws, however underwent a similar process to that for axes.

By the 1880s an English brand, Spear & Jackson's, were reported to have taken 'a great hold on the market'.[15] In 1897 a Tasmanian, A Goold, introduced saws with teeth in the shape of a large inverted 'M' instead of a single peg tooth, and did not patent the design. Disston and Son of the United States, and a British company, apparently Spear & Jackson, immediately began to produce this type, which became known as the Tasmanian pattern. This was soon recognised as the best, and other British makers began to produce it. About the turn of the century Disston saws won all competitions, followed by Simmonds, then Spear & Jackson. At the International Wood Chop and Sawing Competition of 1899, however, neither Spear & Jackson nor any other British firm entered, so the competition was between the Americans Simmonds, H Disston & Co, and the eventual winners, the Atkins saw Co.[16]

Henceforward the 'Tasmanian tooth' as well as the plain or peg tooth saw was a feature of the Australian market, and though Disstons had not won the competition, they appear to have become the leading suppliers.[17]

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11 John Danks & Son Pty. Ltd., *Wood-Workers' and Builders' Tool Catalogue* (Melbourne, no date [c 1900]), p 55.
12 McPherson's Limited, *Catalogue* (Melbourne 1949), p 278.
13 Peter Cunningham, *Two Years in New South Wales* (2 vols, London 1827), II, p 165.
14 Trudy West, *The Timber-Frame House in England* (Newton Abbot [Devonshire] no date), p 88.
15 *Australasian Builder & Contractor's News*, 3 September 1887, p 268.
16 Quanchi, 'World Competition', pp 27-9.
17 Danks, *Wood-Workers' Catalogue*, p 9. A 'Jarrah' or 'M tooth' crosscut saw, in which the tooth shape is similar but perhaps slightly simplified, was later being made by Simmonds and by Sanderson Bros. & Newbould: McPherson's, *Catalogue*, p 25.

pit sawing

Bulk timber was sawn over a pit, in a manner which was traditional not only in Britain, but in many other parts of the world,[18] and requires no particular description here.[19] According to Robert Irving, some of the first sawpits were dug by the marines and were worked by convicts, who were able to saw some slabs in their own time and barter them for other goods.[20] By April 1788 there were already several such pits on the east side of Sydney Cove and at the head of the Tank Stream.[21] A sawpit was established in Brisbane by 1826, and measured 15 by 7.2 metres, to accommodate at least four sawyers. It was built with strong posts, wall plates, tie beams and a thatched roof for shade.[22]

In the bush travelling sawyers would not dig a full pit, but rely upon a partial excavation with a framework to raise the log over it. This is well described by Alexander Harris, who was cedar cutting in the 1820s:[23]

> the ground was so rough and thickly wooded that we had to build a fresh pit to almost every tree. These pits were merely scaffold side-strikes lodged on posts against trees, with long easy skids leading up to them for pitting the log. Sometimes six inches or even a foot of earth might be excavated; but to have dug regular ground pits would have been much too tedious a job; besides which in many places it was so rocky that it would have been impossible. Usually the pits were made very solid; but at other times I felt, I must acknowledge, not quite easy while working under a log of two or three tons weight lodged on side-strikes so small and limber that they sprang up and down two or three inches at every stroke of the saw. ... It was seldom we cross-cut the logs off longer than ten or twelve feet, but our planks were sometimes a couple of feet square on the end, or three and four feet in depth, by six, eight, or ten inches in thickness. These planks were always taken out on either one side or other of the heart, that part of the log being too porous and spongy for use. As the various planks came off the pit, they were rolled over into one large stack in some convenient spot a few feet off; and when the whole tree was cut up, this heap was covered over with cabbage tree leaves, on the outside, to protect the timber from the weather.

In 1881 the *Town and Country Journal* published a description of a sawpit which is more detailed, but shows that practice was essentially unchanged after sixty years. The working surface of the pit was formed of the two 'side skids', of 230 mm diameter timber dressed

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18 Fitchen, *Building Construction before Mechanisation*, p 274, n 10, refers to pit sawing in the Philippines, Japan, Manchuria, Afghanistan, Turkey and Armenia.

19 For a brief description see Philip Cox & J M Freeland, *Rude Timber Buildings in Australia* (London 1969), pp 16-17.

20 Irving 'The First Australian Architecture', p 154.

21 [Francis Fowkes, attrib], 'Sketch and Description of the settlement at Sydney Cove, &c', 16 April 1788, reproduced in Tim McCormick et al, *First Views of Australia 1788-1825* (Chippendale [New South Wales] 1987), p 37.

22 L V Dulhunty, Superintendent of Convicts, 'Quarterly Return of Public Labour and Expenditure of Materials at Morton [*sic*] Bay from the 25th of December 1825 to the 24th March 1826, Inclusive'' Archives Office of New South Wales, ref 4/1917, quoted in J G Steel, *Brisbane Town in Convict Days 1824-1842* (St Lucia [Queensland] 1975), pp 52, 54.

23 [Alexander Harris], *Settlers and Convicts* (Melbourne 1953 [London 1847]), p 44.

flat on the upper face, and 6 to 7.5 metres long. This carried the 'transoms' or cross pieces, about 1.8 m long and 150 mm square, upon which the log was to be placed, including the 'weighing transom' on which a lever was used to manipulate the log, the 'heading in transom' and the 'heading out transom' at either end, and two others upon which planks were placed to form as stage for the top man to stand on when tailing out. The substructure which supported all this above the ground was basically a small stack of cross logs at one end, and a log leaning onto a convenient tree at the other. The pit was dug beneath to a sufficient depth to allow about 150 mm clearance between the pitman's head and the transoms. Two rolling up skids, 3.5 to 5 metres long, leaned against the side of the structure, and the log was manoeuvred up these into its position.[24]

However traditional practices were not unchallenged, for some time previous to this the same journal had relayed a report from the *Scientific American* of what was not actually a pit saw but an 'improved cross cut sawing machine'. It was a device which allowed the operator to sit on an inclined bench and use his muscles more effectively than in the ordinary sawing process. There is no evidence that the machine reached Australia.[25]

sawmills

The timber sawmill has been surmised to date from as early as the fourth century AD, and there are a number of apparent references to sawmills in the early fifteenth century, all of which can be assumed to have used an up-and-down motion.[26] The circular saw is claimed to have been invented in England by John Mainwaring in the 1770s and sold to George Smart in 1799,[27] though it has also been said that circular saws were long used in Holland, and introduced to England by General Bentham. They were used at the Portsmouth Dockyard and elsewhere, but even in the 1820s were not widely adopted in England.[28] Machine sawn timber dating from about 1815 has been found in the United States,[29] but it took half a century for the mechanical sawmill to reach Australia.

The first mechanical sawmill in Australia was a water-powered one established near Hobart in 1825. Peter Degraves and Major Hugh McIntosh acquired land on the face of Mount Wellington in 1824 or 1825, and here Degraves put up a sawmill which he had brought with him from Britain, supplied by one Barton, a steam engine maker and millwright of Falcon Square, London. He and McIntosh employed an overseer and twenty timber getters and mill hands. Despite insolvency proceedings from 1826 to 1831 Degraves persisted, and

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24 *Town and Country Journal,* 24 December 1870, p 12.

25 *Town and Country Journal,* 4 June 1881, p 1077.

26 George Gregory, *A New and Complete Dictionary of Arts and Sciences* (3 vols Philadelphia 1816), sv Saw-Mills, quoted in O W Carroll, 'Mr. Smart's Circular Saw Mill c. 1815', in *APT Bulletin,* V, 1 (1973), pp 58-64.

27 Wyatt Papworth [ed], *The Dictionary of Architecture* (London 1852-92), sv Saw; see also Hentie Louw, 'The Mechanisation of Architectural Woodwork in Britain', *Construction History,* VIII (1992), p 22. Carroll gives Smart's name as George, and cites the description and illustration in Gregory.

28 W Harris et al, *The Oxford Encyclopaedia* (7 vols, Oxford 1828), sv Saw-Mills.

29 Carroll, 'Mr. Smart's Circular Saw Mill,' p 58.

later built a second mill.[30] Water powered flour mills were not uncommon amongst the private settlers,[31] all of them potentially capable of being used for sawmilling as well, but rarely used in this way. Thomas Hall describes the complicated plans that led in the 1850s to the construction of a water powered sawmill on the Killarney cattle station near Warwick, Queensland, which required the building of a dam and the construction of machinery powerful enough to operate four large circular saws. Upon its completion the ready availability of sawn timber stimulated a demand for new houses in Warwick: another mill was established on Rosella Creek, not far way, and then after 1862 John Affleck of the Killarney Mill established a steam mill on the Upper Swan Creek.[32]

The story of watermills being superseded by steam was to be a universal one, though the exact date in individual cases was dependent upon the sufficiency of the water power, the availability of fuel, and the proximity of the market. The first steam sawmill in Australia was projected by the accomplished engineer, John Dickson, but did not come to fruition. Dickson reached Sydney in 1813 with tools, turning lathes, and a steam engine to work his mill. The engine was set up on Cockle Bay (Darling Harbour) and was working in 1815, but used only for grinding flour, not for sawmilling as intended.[33] In 1820 W C Wentworth commented that someone who would take out to Sydney a six or eight horsepower steam engine and machinery for making boards would have a fair chance of success.[34] It was also in about 1820 that a design for a prefabricated sawmill for Van Diemen's Land was prepared, apparently by the engineer Marc Brunel, but it is not clear what became of it, or how it was to have been powered.[35] By 1833 the Van Diemen's Land Company had steam machinery at Circular Head driving a flour and sawmill, with both vertical and circular saws,[36] and by 1837 there were steam sawmills operating in Launceston.[37]

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30 M L Read-McIlreavy, 'Peter Degraves (1788-1852)', in A G L Shaw & C M H Clark [eds], *Australian Dictionary of Biography,* I (Melbourne 1966), pp 302-3; Brian Carroll, *The Engineers* (Barton [Australian Capital Territory] 1988), pp 26-7.

31 In about 1821 William Thornley constructed a small undershot mill at his property on the Clyde, Van Diemen's Land: William Thornley [ed J S Mills], *The Adventures of an Emigrant in Van Diemen's Land* (Adelaide 1973 [1840s]), p 59. In the 1840s Captain Hepburn at Smeaton, Victoria, had built his own water mill, and his neighbour Alfred Joyce, after experimenting with wind power, built a mill powered by an undershot waterwheel, notwithstanding the fact that it had to be dismantled each season to prevent it being destroyed when the creek was in flood. In turn Joyce's neighbour Benjamin Bucknall, who was more fortunately placed at a fall in the creek, built an overshot wheel housed in a permanent mill house. Alfred Joyce [ed G F James], *A Homestead History* (2nd ed, Melbourne 1949 [1942]), pp 69-72. There is no indication that any of these were used for timber milling.

32 Thomas Hall, *The Early History of the Warwick District and Pioneers of the Darling Downs* (Toowoomba [Queensland] 1988 [Toowoomba, no date (?1920s)]), pp 124-6

33 G P E Walsh, 'John Dickson (1714-1843)', in A G L Shaw & C M H Clark [eds], *Australian Dictionary of Biography,* I (Melbourne 1960), p 306.

34 Cox & Freeland, *Rude Timber Buildings,* p 37, n 5, quoting W C Wentworth, 1820.

35 Terence Lane of the National Gallery of Victoria reported a meeting in 1988 with the English art critic, Edward Lucie-Smith, who held four of five drawings for this mill, which he wished to sell. They were said to 'have some connection with the British engineer, Brunel', which, given the date, must mean Mark Brunel rather than his more famous son. I wrote to Smith seeking information with a view to making an offer, but received no reply.

36 Thomas Horton & Kenneth Morris, *The Andersons of Western Port* (Bass [Victoria] 1983), p 38, citing Records of the Van Diemen's Land Company at Circular Head, Archives Office of Tasmania.

37 A R J Billman, 'The Timber Vernacular' (BArch, Deakin University 1992), p 165, citing John Dargavel [ed], *Sawing, Selling and Sons* ([Centre for Resource and Environmental Studies] Canberra 1988), p 19.

On the settlement of Adelaide the South Australian Company engaged Henry Mildred to buy the necessary apparatus in the north of England for a steam saw and corn mill, as well as a shipyard and patent slip. He reached Kangaroo Island on 22 April 1837 and after some delay part of the plant was moved to Adelaide. Here the engine and mills were put up, and were generally known as the 'Company's mill'.[38] In 1839 a handbook for South Australian emigrants was advertising 'sawing machines'.[39] In Sydney the first steam powered saw is claimed to have been in operation by October 1838, and it is said to have been a vertical reciprocating saw which could turn out true pieces in a hundredth the time of the pit sawyers.[40] In 1842 a circular saw, described as being twice as fast as its predecessor, went into operation in Sydney.[41] Two steam flour and sawmills seem to have opened in Melbourne in 1841, and there were several by 1845.[42] In 1844 Western Australia's first steam sawmill began operations at Guildford.[43]

A steam sawmill was built at Brisbane Water, New South Wales, in about 1853-4 under the supervision of the engineer H C Mais.[44] In Brisbane William Pettigrew opened the first steam sawmill on the corner of William and Margaret Streets, by Queens Wharf, in 1853[45] and by this time they were quite numerous in other settled areas of Australia. By 1865 there were nineteen sawmills in Queensland as a whole, and thirty-one by 1868.[46]

woodworking machinery

The 'ribbon or endless saw' was known in Britain by 1808, but seems not to have been seriously taken up until the 1850s,[47] and we have no indication of when it reached Australia. More is known of milling and moulding machinery. In 1846 milling machines appeared in Sydney, including one which could run four faces of a moulding simultaneously, and, operating with two men and a boy, could do the work of 250 joiners.[48] In 1846 W H Burnett of London was promoting a new moulding machine on the basis that he would sell only two in Sydney and one in Melbourne,[49] but in Melbourne at least, a moulding mill was

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38 J W Bull, *Early Experiences of Life in South Australia* (London 1884), 24.
39 Henry Capper, *Capper's South Australia* (3rd ed, London 1839 [1837]), Advertisements p 34.
40 Cox & Freeland, *Rude Timber Buildings*, p 37, n 4, quoting the *Sydney Herald*, 31 October 1838. They presumably refer to a mention on p 1 of 'Dickson's Steam Mills', though these, as we have seen, were apparently flour rather than sawmills. In the *Herald* of 26 October 1838 there is an advertisement for W G Card & Co's Australian Saw Mills in Bathurst Street, though it is not stated that these are steam powered. Where Cox and Freeland get their information about the type of saw is unclear.
41 Cox & Freeland, *Rude Timber Buildings*, p 37, n 6.
42 Miles Lewis, 'Tradition and Innovation in Victorian Building' (3 vols, PhD, University of Melbourne 1972), I, p 137; III, pp , 557-8.
43 Jenny Mills, *The Timber People* (Perth 1986), p 67.
44 Sally O'Neill, 'Henry Coathupe Mais (1827-1916)', in Bede Nairn et al [eds], *Australian Dictionary of Biography*, V (Melbourne 1974), p 200.
45 Donald Watson, *The Queensland House* (report, Brisbane 1981), p 4.3.
46 Watson, *The Queensland House*, p 5.3.
47 R S Burn, *Modern Building and Architecture* (London, no date [c 1870]), p 192.
48 Cox & Freeland, *Rude Timber Buildings*, p 37, n 7.
49 *Port Phillip Herald*, 12 November 1846.

established only in early 1854 by James Swinbourne (later Bleasby, Swinbourne & Co).[50] Later that year, however, W & J Gripe of the City Saw Mills showed at the Melbourne Exhibition a moulding machine which had actually been made in the colony, as well as some of the mouldings made by it.[51] By 1855 there were at least six moulding mills in Melbourne,[52] and in that year the firm of Goodlet & Smith was founded in Sydney,[53] though it is unclear whether they were anything more than a sawmill in the first instance.

Mortising machines came into use overseas towards 1850. One was invented by the American engineer J A Fay, patented in England by William Furness of Liverpool, and was in use at E T Bellhouse's works at Manchester by 1849.[54] At the Melbourne Exhibition of 1854, Joseph Hill of Emerald Hill, Melbourne, displayed a 'Coulson's Patent Mortising Machine, with 6 chisels in various sizes and 2 spanners, for altering the machine at convenience.'[55] This was an imported machine, only one of at least five types which had become available in England by this time, though perhaps of particular value in the colony because it was said to be able to mortise hardwood as well as soft.[56] By 1858 another type, Hugh's patent, had been imported by the Collins Street agent G H Pettigrew,[57] and at the 1866-7 Exhibition, Briscoe and Company of Melbourne showed a mortising machine.[58] In 1870 Greville & Co of Sydney showed two Merrett & Gibbs patent boring and mortising machines, one with a wooden and one with an iron frame, though these were more specifically intended for fence posts.[59]

At the 1866-7 Exhibition, Briscoe and Co had also shown an imported steam-driven machine for planing, grooving, boring, moulding, tenoning and mitreing.[60] In the 1880s, however a South Australian called Rendon invented a planing and moulding machine which was said to be more effective than any then known in the colonies.

British and overseas developments in woodworking machinery are so numerous that it is difficult to analyse their impact in Australia. For example, the first machine-made parquetry was produced at the East London Commercial Saw Mills in 1843, at one third the cost of the handmade product.[61] Given that all parquetry flooring was of imported timbers until late in the century, one can only surmise that it was manufactured in Britain or elsewhere, using this or comparable machinery. Fretwork provided a cheap alternative to the elaborately modelled bargeboards of the picturesque Gothic house. It came into vogue in Britain in the years following the Paris Exhibition of 1867, and became especially popular in the 1880s,

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50 Isaac Selby, *The Old Pioneers' Memorial History of Melbourne* (Melbourne 1924), p 144; C B Mayes, *The Victorian Contractors' and Builders' Price-Book* (Melbourne 1859), p xliv. By 1855 there were six mills: Lewis, op cit, I, p 142.

51 *Official Catalogue of the Melbourne Exhibition, 1854* (Melbourne 1854), p 15.

52 Lewis, 'Victorian Building', I, p 141-2.

53 *Australasian Builder & Contractor's News*, 28 May 1887, pp 37.

54 *Manchester Examiner and Times*, I, 98 (10 October 1849), p 4. See also the *Builder*, XI, 539 (4 June 1853), p 367, & 565 (5 December 1853), p 739.

55 Melbourne Exhibition 1854, *Catalogue*, p 19.

56 *Builder*, X, 396 (19 July 1852), p 398. See also V, 221 (1 May 1847), p 210, for Jones's patent; VII, 335 (7 July 1849) for Mortimer's patent; and 525 (28 February 1853), p 144, for Worrsam & Co's

57 Victoria Industrial Society, *Catalogue of the Eighth Annual Exhibition* (Melbourne 1888), p 28.

58 Intercolonial Exhibition of Australasia, 1866-67, *Official Record* (Melbourne 1867), p 39.

59 *The Industrial Progress of New South Wales* (Sydney 1871), p 113.

60 Intercolonial Exhibition 1866-67, *Official Record*, p 39.

61 Hentie Louw, 'The Mechanisation of Architectural Woodwork in Britain, Part IV', *Construction History*, XII (1996), p 21.

when it was produced using fret machines from the United States.[62] The situation was probably just the same in Australia.

> A light wooden frame-work is constructed 6 feet [1.8 m] square by 6'6" [1.95 m] in height, with sloping hip-rafters on top to form a square roof. This frame-work is covered with canvas or Hessian cloth down to 9 inches above the (pine) floor. The lower 9 inches is occupied by a fly-proof perflation panel of fly-netting. From the peak of the roof, a vertical ventilating pipe takes off, capped by a cowl. This pipe is about 6 feet long so as to induce a good draught. A framed door, covered with canvas, is provided in one side of the room.

Mechanical woodcarving made an appearance in Britain in the 1840s, and Jordan's machine achieved considerable commercial success in the 1860s and 1870s, and late in the century there was a revival of activity based largely upon American machines.[63] In 1866 William Williams exhibited at Melbourne a machine intended for turning axe handles, but in principle capable of much wider application:[64]

> A model of the article to be produced is placed in one portion of the machine, and a piece of wood roughly shaped, and of sufficient bulk to enable an article of similar size and shape to be manufactured from it, is introduced into another part of the machine. By an ingenious arrangement of mechanism, the model is strictly copied, and its form reproduced in the rough timber placed in apparatus.

The machine had already been in use in Melbourne for some years, and there is no reason to suppose that it was a local invention, so it was probably one of the overseas models such as Jordan's.

Subsequently Marles and Butt of England developed what was described as the first effective wood carving machine, the 'Marbut', which was manufactured for therm by the Ransome Engineering Works and patented all over the world.[65] This was claimed to produce work equal to anything that could be dome by hand.[66] A Melbourne man, A Holloway, visited England and obtained patent rights for Australia, then established the Australian Marbut Carving Company Limited, of Queen Street, Melbourne. Much of the production consisted on non-architectural goods such as furniture and picture frames, but it also included skirtings, architraves and chair rails.[67]

seasoning

The degree of shrinkage in Australian timber is such as to make thorough seasoning very desirable. In 1820 Patrick Riley of Newcastle advocated felling the trees only in the winter months of May, June and July, cutting the timber into planks, and exposing it to the weather.

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62 Louw, 'The Mechanisation of Architectural Woodwork in Britain, Part IV', pp 20- 21.
63 Louw, 'The Mechanisation of Architectural Woodwork in Britain, Part IV', p 20.
64 Intercolonial Exhibition 1866-67, *Official Record*, p 368.
65 James Smith [ed], *The Cyclopedia of Victoria* (3 vols, Melbourne, 1903, 1904, 1905), II, p 159.
66 Louw, 'The Mechanisation of Architectural Woodwork in Britain, Part IV', p 28, quoting the *Illustrated Carpenter and Builder*, Supplement, 27 July 1900, p 4. According to Louw the machine was not invented by Marles and Butt, but by a joiner, H Marbut, employed by Allen Ransome & Co.
67 Smith, *Cyclopedia of Victoria*, II, p 159.

How long it was to be thus seasoned is unclear, but Riley did say that insufficient time was being allowed at Newcastle because of the level of consumption at 'Head Quarters' [Sydney].[68] It seems improbable that the average timber cutter would be prepared to confine his activities to three months of the year, quite apart from the pressure to skimp on the seasoning.

Salt water seasoning was a traditional method, mentioned by Pliny and advocated by John Evelyn. Some, however, argued that fresh water was better, and there was also an intermediate school which favoured salt water for ships' timbers and fresh water building timbers.[69] Captain Henry Waterhouse reported in 1802 that logs which were cut down at Sydney in 1788 to clear the land for settlement, and rolled into the water, had been taken up years later and found to be as sound as they began.[70] This was of course fortuitous, and deliberate attempts at salt water seasoning come later. At Alexander Berry's 'Coolangatta' estate at Shoalhaven, in the 1820s, his builders were required to throw the planks for the barn floor[71]

> into the canal and allow it to remain for a fortnight - this will not only extract the sap and render it less liable to shrink after it has again become dry - but the salt will prevent it from being attacked by the worm.

In Western Australia jarrah logs were left in sea water for a few weeks, then drawn up onto the beach and covered with a few inches of seaweed, their ends protected from the sun. They were then left for a number of months to season, cut into boards 180 mm wide, stacked to allow air to pass around them, and left five or six months longer before use.[72]

An important innovation in the later nineteenth century was the introduction of seasoning on the Reiser system, which made a number of local timbers viable for joinery and finishing. Reiser was a Swiss who was reportedly on Maria Island, Tasmania, in 1887. In 1888 he was living in Melbourne, and obtained a patent for improvements in apparatus for seasoning timber,[73] and soon afterwards he and A D Hunter sought and gained government financial assistance,[74] probably for what was at first called the Melbourne Reiser Timber Seasoning Syndicate. By now the sawmiller R A Robertson was involved, for he told the Commissioner for Customs in June 1889 that he was representing a Swiss method of seasoning timber, and that if a duty were to be levied on imported wood he would be able to produce timber from colonial woods just as good as the imports.[75]

In 1892 the Australian Seasoned Timber Company Limited was formed to unite the interests of the Comet Mills, the Melbourne Reiser Timber Seasoning Syndicate and,

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68 Evidence of Patrick Riley [undated but c 1820], in John Ritchie [ed] *The Evidence of the Bigge Reports* (2 vols, Melbourne 1971), I, p 113.

69 T A Britton, *A Treatise on Dry Rot in Timber* (London 1885), pp 73-6.

70 Captain Waterhouse, 'Memorandum on the Timber of New South Wales', 2 March 1802, Public Record Office, London, CO 201/1, quoted in Daniel Paine [ed R J B Knight & Alan Frost], *The Journal of Daniel Paine 1794-1797* (Sydney 1987), p 78.

71 Papers of Alexander Berry, volume 5, 16 August 1824, quoted by Rachel Roxburgh & Douglass Baglin, *Colonial Farm Buildings of New South Wales* (Adelaide 1978), p 32.

72 Britton, *Dry Rot*, p 115.

73 *Australasian Builder & Contractor's News*, 29 December 1888, p 600.

74 G S Perrin, *Australian Timbers* (Sydney 1893), p 26.

75 *Australasian Builder & Contractor's News*, 29 June 1889, p 606.

apparently, the Victorian Terra Cotta Company, makers of terra cotta lumber (as discussed below).[76] The principals included Robertson, Hunter, and presumably Reiser himself, and a mill was established at Wandong on the North-Eastern Railway Line, near Kilmore.[77] An early instance of the use of the process is the court house at Bairnsdale, Victoria, for which 'samples of mountain ash of beautiful grain and colour, and to all appearances perfectly seasoned', were submitted in 1894 by the Australian Seasoned Timber Company.[78]

Neither the seasoning nor the terra cotta lumber business was viable during the depression of the 1890s, the latter being kept open for only three months in the second half of 1896, and apparently entirely inoperative in 1898 and 1899.[79] But the sawmill expanded, and despatched a shipment of wooden paving blocks to London, from which a major contract was expected to follow. Apparently this did not eventuate, and in any case the Comet Mill was burnt down in 1900, and it was decided in 1902-3 to move the business to Western Australia and to liquidate the Australian Seasoned Timber Company.[80]

After World War I the Melbourne firm of Cuming, Smith & Co established a wood distillation and timber seasoning works near Warburton. The seasoning was done by what they described as 'the moist air method', in which the timber, after some preliminary drying in the open air, was placed for a week or more in a kiln with the humidity controlled to suit the wood being treated.[81] The heat was supplied by steam-filled pipes, over which passed the air entering the kiln, and this seems to be but a little way short of the system of steam drying in kilns which was introduced in Western Australia. Jarrah had reputation for cracking, and did this even after a periods of open air seasoning at the mill.

The American visitor H D Tiemann developed his 'water spray humidity regulated kiln' for drying jarrah, in which the first rapid seasoning tests in the state were begun in 1918. Timber was stacked in the kiln and dried using steam heated coils, and the air was humidified as it passed through water was sprayed within chambers on either side. When the drying was proceeding too rapidly, and traces of surface cracking began to appear, live steam was introduced, and by this means the moisture content was kept consistent throughout he plank during drying. By 1932 all commercial kilns in Western Australia save one were of this type.[82] In the meantime a range of modifications and developments had given rise to at least half a dozen local patents.[83]

In Victoria the method used by Cuming Smith remained adequate, and it was streamlined when P V Christensen of the firm of Christensen & Saxton, Moe, developed what became known as the 'Christensen truck', which eliminated double handling of the timber. The pieces which were being initially air-dried were placed on bolsters which rested in turn on

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76 J W Payne, *Pretty Sally's Hill* (Kilmore [Victoria] 1981), pp 56-7.
77 Perrin, *Australian Timbers*, p 26.
78 *Bairnsdale Advertiser*, 26 April 1894.
79 Colin Harvey, *Wandong Wanderer* (tour notes of the Light Railway Research Society of Australia Inc, 1981, unpaginated).
80 Payne, *Pretty Sally's Hill*, pp 57-8.
81 Cuming, Smith & Co Pty Ltd, *Our Forest Industries* (Melbourne, no date, unpaginated).
82 S A Clarke, *The Seasoning of Western Australian Hardwoods* (Perth 1927), pp 34-42; Staples, *They Made Their Destiny*, p 331.
83 A J Gibson, *A Forest Products Laboratory for Australia* [Council for Scientific and Industrial Research pamphlet no 9] (Melbourne 1928), p 11.

sleds or foundations built over a set of rails, and the stack was of the size which was required to charge the kiln. When the time came to transfer the wood to the kiln the truck could be slid along the rails under the stack, lift it, and shift it as required.[84]

preservative treatments

Preservative treatments for timber were not so common in Australia as in Britain because hardwoods would not absorb chemicals to any significant extent, though of course there were primitive processes used at times. One of the earliest was J H Kyan's process, which involved soaking the wood in corrosive sublimate (mercuric bichloride).[85] During the 1840s there was a great deal of attention given in England to preservative treatments for timber, spurred on especially by the demand for railway sleepers. Bethell's process, patented in 1838, is the most relevant to later Australian developments. It involved impregnating the wood with oil of tar [creosote] and pyrolignite of iron [iron acetate].[86] Sir William Burnett's process, also dating from 1838, used zinc chloride which, when deposited in the timber, was supposed to harden it and to form a permanent compound which could never be leached out.[87] There were many preservative works in the country, but by 1853 Durrand's Bonded and Sufferance Wharf at Rotherhithe had particular connections with the foreign and colonial trade because it could import and re-export Baltic and other timbers without incurring British duties. By 1853 it was equipped for carrying out Bethell's, Payne's, Burnett's and Margery's processes. All were supposed to be preservative, and Bethell's also to have some fireproofing value.[88]

'Non-combustible' timber had made its appearance in Victoria by 1854,[89] but there was at first no attempt to treat the local timbers, doubtless because their structure made them far more difficult to inject, and because some were naturally very durable in any case. In June 1856 the *Australian Builder* published the first local description of a method of fireproofing timber, by steeping it for four or five days in a strong solution of alum and copper sulphate.[90] In 1874 the *Town and Country Journal* relayed an English report of a Dr Jones's patent treatment, which had been shown experimentally to protect timber and even gunpowder from fire. But the nature of the substance is not revealed, and there is no evidence of its use in Australia.[91]

Following the report on fireproofing timber, in 1856, the *Australian Builder* published a summary account of the three main processes for inhibiting decay, Kyan's, Payne's and Bethell's.[92] Of these Kyan's process, whereby the timber was either soaked in or injected

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84 *Combined Air and Kiln Seasoning: Handling by Means of the Christensen Truck* [Trade Circular no 12 of the Council for Scientific and Industrial Research, Division of Forest Products] (Melbourne 1932), passim.

85 *Mechanic's Magazine,* XVIII, 489 (22 December 1832), p 189; George Birkbeck, *The Preservation of Timber by Kyan's Patent* (London, no date [c 1835]).

86 Wyatt Papworth [ed], *The Dictionary of Architecture* (London 1853-92), svv Bethell's Patent; Creasote [*sic* - allegedly the correct spelling].

87 Papworth, *Dictionary,* sv Burnettizing.

88 *Builder,* XI, 526 (5 March 1853), p 160.

89 *Mount Alexander Mail,* 15 September 1854.

90 *Australian Builder, 17* (26 June 1856), p 138.

91 *Town and Country Journal,* 4 June 1881, p 1077.

92 *Australian Builder,* 27 (21 November 1874), p 817, quoting the *Building News*.

with corrosive sublimate (mercuric chloride or bichloride) was particularly expensive - notwithstanding the fact that the chemical was widely used in Australia for treating scab in sheep - and it was ousted by Burnett's process, which used much cheaper zinc chloride. Both were in fact of limited value because they precipitated soluble salts which washed out, and because they were acidic and caused corrosion in any iron fittings attached to the wood.[93] Payne's process involved the precipitation of an insoluble salt, of which there were various types, but the original version used iron sulphate and calcium chloride to precipitate calcium sulphate.[94] The process was promoted in South Australia, after which an attempt was made to set up a company in Melbourne to market it. A meeting was held in the Criterion Hotel on 24 April 1858 to consider the matter,[95] but nothing seems to have come of it.

The most effective method of injecting timber was that of James Burton, using a pressure cylinder, but that was not introduced to the Australian colonies until many decades later. Apart from simple soaking, the alternative method was that of the French physician Boucherie, who inserted chemicals into the living tree so that they were taken up naturally. Something of the sort was done to trees in Royal Park, Melbourne, by one Léonce Richards, who claimed to have patented his process of 'metallisation',[96] but discrepancies in the reporting of this, and the absence of any patent in Richards's name or that of his agent Caspar, make it impossible to determine what was actually done.

A quite different approach was the use of silicates, which Frederick Ransome had developed in England principally as a means of preserving stone and of creating artificial stone, but also for preserving timber. Richard Forrest obtained a Victorian patent in October 1861 for the preservation of materials, including timber, using 'an alkaline solution of silica, from which, after application, the alkali is extracted by means of some other mineral.'[97] A further patent in Ransome's own name in 1862 seems to overlap with Forrest's in using 'certain silicates ... in the manufacture of artificial stone and cement or plaster, and in treating timber for the purpose of preserving the same.'[98] Forrest was reported to be a Melbourne merchant,[99] and it seems possible that he was a member of the firm of Sprigg, Addison & Co of Flinders Lane, who were Ransome's Melbourne agents.[100]

A further local patent by A C L De Lacy seems to cover similar ground, using 'certain chemical fluids and operations' for preserving wood and other materials from decay and fire, manufacturing artificial stone, &c. De Lacy was a Melbourne engineer, but it is impossible to determine whether this was in any sense his own development or whether - as seems more probable - it represents the extension of a British patent. Nor do we know whether it was put into practice locally. The patent is more concerned with the means of impregnation, using a pressure cylinder which he had patented five years earlier, and de Lacy named a

93 For a more detailed discussion of these treatments see Miles Lewis, 'Tradition and Innovation in Victorian Building' (3 vols, PhD, University of Melbourne 1972), II, pp 163-8.
94 Papworth, *Dictionary*, sv Payne's Process.
95 *Argus*, 27 April 1858.
96 *Argus*, 25 November 1857 & corrigendum, 26 November 1857. Again, see Lewis, 'Tradition and Innovation', for more detail.
97 Victorian patent no 508 granted to Richard Forrest, 26 October 1861.
98 Victorian patent no 593 granted to Frederick Ransome, 20 November 1862.
99 C B Mayes, *Australian Builders' Price-Book* (Melbourne 1862), p 144.
100 Mayes, *Australian Builders' Price-Book* (1862), pp xiii, 151.

number of chemicals which he would inject separately or in combination - calcium chloride, magnesium chloride, sodium silicate, aluminium sulphate, aluminium chloride, potash, creosote and fluoric acid.[101]

There is little reason to suppose that any of these treatments would be particularly successful, and no evidence to suggest that they were. Coating with tar was a practice which gained far more currency than injection with chemicals, and it rose to popularity with the establishment of gasworks, of which tar was a cheap by-product. In 1858 the Melbourne Gas Works engineer A K Smith exhibited coal tar which he said was suitable for the preservation of timber.[102] A patent was granted to James Thomson in that year for what seems to have been some sort of a varnish, combining tar with other chemicals,[103] and another to W J Barton in 1860 for 'indurating and enamelling' wood and other substances with a solution of gas tar and resin.[104] Barton & Co are known to have used the process for stone preservation, though not necessarily for timber. However the 'oil of tar' which was produced by both the Melbourne and the Collingwood gasworks, was reported to be used on timber as a preservative.[105] In 1878 the stumps of a courthouse in Queensland were specified to be of ironbark or bloodwood 'slightly charred and twice coated with hot coal tar + lime'.[106]

The next phase of development involved the use of oils other than (or in addition to) creosote. In 1887 it was announced that A M Fell & Son of Darling Harbour, Sydney, were supplying a wood preserving oil to prevent both dry rot and white ant, and that it was already in use by the government and several municipalities.[107] However A R Taylor of New Farm, Brisbane, responded that the Fell oils had already been abandoned in Queensland after repeated trials, and that his own patent preparation was now used instead.[108] In 1892 a resident of Merrigum, Victoria, recommended linseed oil into which pulverised coal had been mixed to bring it to the consistency of paint, which was guaranteed to prevent the rotting of posts in the ground.[109]

In 1919 ironbark and bloodwood were still being used in Queensland for stumps, but now 'twice (2) well coated with crude castor oil, well dusted over with arsenic after each coat where below ground and the remainder given two coats of well boiled coal tar, applied hot'.[110] The use of arsenic indicates that this was now not merely a preservative but an ant-proofing measure, and such treatments will be further discussed below. Early in the twentieth century the 'Powellising' process was apparently regarded as effective even for hardwoods. It was marketed by the N.S.W. Powell Wood Process Ltd. of Sydney, and claimed to improve, strengthen and thoroughly season the timber. H D Walsh, Chief

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101 Victorian patent no 602 to Alan Cameron Lyster De Lacy, 30 December 1862.
102 Victoria Industrial Society, *Catalogue of the Eighth Annual Exhibition* (Melbourne 1858), p 43.
103 Victorian patent no 91 granted to James Thomson, 17 March 1858.
104 Victorian patent no 393 granted to W J Barton, 9 October 1860.
105 Mayes, *Australian Builders' Price-Book* (1862), p 83.
106 'Specification of Work and material required in the erection of court house St Laurence', March 1878 [held by Historic Buildings Branch, Brisbane], no page.
107 *Australasian Builder & Contractor's News*, 17 September 1887, p 297.
108 *Australasian Builder & Contractor's News*, 22 October 1887, p 391.
109 *Farmer and Grazier*, February 1892, p 38.
110 'Specification: Erection and Completion of a new Rural School: Boonah', 17 February 1919 [held by Historic Buildings Branch, Brisbane], p 67.

Engineer of the Harbor Trust, used powellised decking in some of his jetties and wharves.[111] It was also carried out in Victoria, where it gave its name to Powelltown in the Little Yarra Valley, Gippsland. It has been reported as an English process which proved ineffective for Australian hardwoods,[112] but this must be an overstatement, given that it was used for some time in this country.

In 1928 the visiting expert A J Gibson spoke of Powellizing as a process used for some years in Western Australia, though not apparently elsewhere, and referred also to experiments with creosoting at the University of Adelaide.[113] In Western Australia, apart from Powellizing and creosoting, the Forests Department established a commercial operation to treat timber by the 'open-tank method' in a solution of sodium fluoride and arsenic, patented as 'fluarizing'. Western Australian efforts were directed more at fence posts than at building scantling, but the range of preservatives in use is interesting - coal tar creosote was regarded as most effective; tar and petroleum oil were useful; but creosote and oil mixtures had some value, and were cheaper than pure creosote. There were also various proprietary oil preservatives, some of very little value. The water-soluble preservatives were sodium fluoride, zinc chloride, white arsenic, and various proprietary products.[114] When the Council for Scientific and Industrial Research came to produce its own circular on timber preservation, the means described were largely the same, but for the fact that copper sulphate, mercuric chloride and zinc meta-arsenate had ben added to the list, though only the last was in any sense new.[115]

antproofing

We have seen that the Fell oils, and the use of arsenic dust, were used in treatments designed to prevent both decay and termite attack. Buirt there were many other substances designed specifically to control white ants. Natal makes an interesting comparison with Australia, for not only was the use of stumps understood at an earlier date (as will appear below), but chemical treatments likewise. Early settlers had painted 'a low plinth' of Stockholm tar around the base of their buildings, though this proved ineffective.[116] In 1864 a paint for outside walls was recommended, supposed to render them impervious to white ants and other insects. It was made of '1½ bushels of grey lime, 1½ bushels of Roman cement, 6 lb. of copperas, 6 lbs. of soft soap, 6 lbs. of sulphur, and as much yellow ochre as will bring the whole to any desirable colour.'[117] In 1866 creosote was advertised a protective material.[118] In Rhodesia some pisé buildings had arsenate of soda or 'Atlas Compound' mixed into the lower layers to antproof them.[119]

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111 *Building,* 12 December 1911, p 34, and advertisement. p 23.
112 Paul Edwards, in *Royalauto,* November 1996, p 66.
113 A J Gibson, *A Forest Products Laboratory for Australia* [Council for Scientific and Industrial Research pamphlet no 9] (Melbourne 1928), p 16.
114 J E Cummins, *The Preservative Treatment of Fence Posts (with particular reference to Western Australia* [Council for Scientific and Industrial Research pamphlet no 24] (Melbourne 1932).
115 *The Preservation of Timber* [trade circular no 27 of the Council for Scientific and Industrial Research, Division of Forest Products] (Melbourne 1935), pp 15-17.
116 Kearney, *Architecture in Natal,* p 68.
117 Kearney, *Architecture in Natal,* p 65, ref *Davis' Natal Almanac* of 1864.
118 Kearney, *Architecture in Natal,* p 65, ref H Brookes & Mann, *Natal, a History and Description of the Colony* (1876).
119 Clough Williams-Ellis, *Cottage Building in Cob, Pisé, Chalk & Clay* (London 1919), pp 78-9.

Peter Bell reports the use of treacle and arsenic against termites at Bowen in 1882, as prescribed in an unidentified 'official circular', and of Street's and Faulding's White Ant Poison, based on arsenic, as well as the procedure of steeping the stumps in creosote before they were used.[120] As a prophylactic measure treacle and arsenic seemed, in at least one instance, only to render the timber more palatable, but Watson mentions a number of other chemicals which were used in Queensland. Carbolic acid and boiling water were applied to timber which was already under attack. Timbers were immersed in salt water, animal fats, oil or tar, or they were charred - all of which sound more like preservative than white ant measures. In the 1870s there appeared proprietary products such as the zinc-based compound marketed by Hiram Wakefield, and in 1874 William Malpas of Athelstone, near Adelaide, obtained a patent for the use of copper sulphate combined with 'arsenious' acid, sodium carbonate and other chemicals. This was applied to the lower timbers of an existing building at Caboolture in 1878. 'Taylor's Anti-termite' was in use in the 1880s, as were 'Anti-ant Wood Preservative', which was allegedly in use in India, China, Japan and elsewhere, and 'Antine', which was tried out at Inglewood and proved quite ineffective. By 1895 tar and arsenic had resumed their dominant position.

Some protection was gained simply by using cypress pine, a timber less palatable to ants, and clearing the site of all loose timber which might harbour them.[121] In 1889 the Diocesan Architect, J H Buckeridge, examined the bell tower of the Anglican pro-cathedral in Brisbane, which had been constructed of English oak because this was thought to be termite-resistant. The hearts of the beams carrying the balls were completely eaten out. One of the legs, 450 mm square, was half eaten through to a height of nearly five metres. He replaced the damaged posts with Queensland hardwood on a concrete bed, and the treated the whole with an anti-termite preparation.

In 1908 the Bain's White Ant Extermination Company of Sydney claimed to be contractors to the Commonwealth, New South Wales and West Australian governments, the Sydney Harbour Trust and the Federated Malay States,[122] while a liquid product called 'Jodelite' was claimed to be effective not only against the ant, but against fungus, dry rot and sea worm.[123] In about 1920 a chemical white ant preventative was regularly advertised in the post office directories in Queensland.[124] In 1949 'Solignum', which had been in existence for thirty years, was being advertised in Australia as a 'wood preserving stain' and white ant and borer destroyer. However it was an English product, and references were cited from Khartoum,[125] so there is no clear evidence of its use in Australia. Indeed it is a moot point whether the 'remarkable penetration' claimed in the advertising, would have had any impact on Australian hardwoods.

markings

120 Bell, *Timber and Iron*, p 163.
121 Watson, *The Queensland House*, pp 6.2-6.8.
122 C E Mayes, *The Australian Builders and Contractors' Price-Book* (7th ed, Sydney 1908), p 226 & advertisements p xx.
123 Mayes, *Australian Builders Price-Book* (1908), p 22
124 Information from Peter Marquis-Kyle, 1991.
125 F Wentworth & W L Richardson [eds], *Ramsay's Architectural and Engineering Catalogue* (Melbourne 19549), §32,3.

The markings on timber are often a source of great confusion, but they usually fit into one of three broad categories: they are to do either with the production, the shipping, or the assemblage of the material. Production markings include those of the timber mill or the prefabricator, like 'Skillings and Flint, Boston'. There are also marks of quality and origin, which have been little reported in Australia. The most elaborate series of markings were those for red deals, which had different codes according to whether they were from:

> Christiana [Oslo], Norway
> Drammen, Norway
> Fredericstadt, Norway
> Laurvig, Norway
> Skien Porsgrund, Kragero, and Throndjem [Trondheim], Norway
> Gothenburg, Sweden
> Gefle, Sweden
> Soderham, Sweden
> Hudiksvall, Norkoping, Sundswall, Stockholm, Lojune and Mo, Sweden
> Uleaborg, St Petersburg and Bjorneborg, Russia
> Dantzic [Dantzig], Prussia.

Many of these ports supplied timber in five grades of quality, one to four, plus one and two mixed. There were up to nineteen letter / numeral combinations used within a single grade from a single port. Deals from Russia and Finland were branded with the blow of a hammer, but those from Sweden had stencil markings in red paint.[126] Even in the early twentieth century idiosyncratic distinctions persisted - for example Riga timber was marked with a triangle, meaning 'best middling', a cross formed of double lines for 'good middling', or the same cross in a circle for 'common middling'. There were other codes for Dantzig timber, and there were also codes which combined the identity of the shipper and the quality, such as 'P.B.2' for St Petersburg timber of Peter Belaieff's second quality.[127]

Shipping marks might include the name of the shipper or the ship, stowage instructions, the symbol or initials of the consignee, and finally identification marks for each bundle. Gromoff Petersburg deals were marked 'C. and Co.' for the shippers, Clark & Company.[128] The name of the ship was usually stencilled, as 'VORWARTS'; stowage instructions like 'stow aft' may be painted or stencilled. The consignee might be indicated by a triangle, oval or other shape containing initials of a company, as in 'C T & Co' (for Caldwell, Train & Co), or a private person such as 'E de C' for Edward de Carle or 'J A G' for J A Gregory. Edmund Bowman, in Adelaide, wrote to his father in Van Diemen's Land:[129]

> dear Father, if you should happen to send any goods be sure to put a mark on the bags so they will be known. Like this, E.B. You will need three bills of lading, one for the Captain to keep, one must come to me in a letter, and the other you must keep.

126 P B Eassie, *Wood and Its Uses* (Gloucester 1874), pp 5-8.
127 P N Hasluck [ed], *Cassell's Carpentry and Joinery* (Philadelphia 1912), pp 43-5.
128 Hasluck, *Cassell's Carpentry and Joinery*, p 45.
129 Elizabeth Warburton, *Martindale Hal*l (Adelaide 1979), p 20.

This is really only the most elementary level of identification, because usually the consignee's initials will be augmented by combinations of letters, numbers, symbols and shapes, which would appear on the package or the outermost board or piece in the bundle, and would match an entry made in the margin of the bill of lading, allowing the consignment to be checked.

It is interesting to compare two prefabricated buildings imported to Melbourne from Robertson and Lister of Glasgow in about 1853. The timber lining of 399 Coventry Street, South Melbourne, has markings such as a diamond containing the letters 'RAP' followed by a dollar sign with angled slashes, then a numeral. RAP are the initials of the consignee, Robert A Patterson. The Brown Brothers store at Geelong has a diamond, a 'g', a similar dollar sign, and a numeral. The diamond contains a symbol consisting of two Bs, one reversed so that they share a common vertical, and presumably standing for Brown Brothers. The 'g' may refer to Geelong. In this case a similar code appears on the corrugated iron sheets, confirming that it is to do with the identification of the consignment rather than being anything specific to the timber trade.

Carpenters framing a building traditionally identified each piece with Roman numerals, originally introduced in medieval times before the introduction of Arabic numerals, and continued into the nineteenth century because they could be cut with a chisel. The number of strokes was economised by eliding figures, so that XV might become a V with an extra slash through the left arm,[130] and XX, became two parallel strokes in one direction intersected by a single stroke in the other. Numerals like IX and XI, which could be mistaken for each other when seen upside down, were replaced by other versions, like VIIII. Because V was often inscribed upside down, even IV and VI would be confusing, so four became IIII.[131] Substantially the same markings are used in German-built houses such as 'The Heights' at Geelong and 'The Chalet', Sydney, in each case beautifully cut.[132] They appear also in buildings of local construction, especially in principal members such as those of roof trusses.

These marks need not be confused with the sometimes similar versions of Roman numerals used on logs to indicate cubic content,[133] for the latter are not chiselled but in chalk. In prefabricated buildings lettering is often painted on: for example, each joint is assigned a number, and that number is hand painted (rather than stencilled) onto every member where it runs into that joint. Sometimes the members rather than the joints are numbered sequentially, and for this purpose stencilling may be used. Sometimes the labels were more descriptive, like 'bottom plate' or 'window head'.

Similar questions arise in relation to the prefabricated Chinese houses brought to Australia in the 1840s and 1850s. Some have Chinese or other characters on the timber, and one in particular has been as fully researched as possible. This is a house built in East Melbourne

130 Huddle reports this at 'The Heights', Geelong, together with V//, XI and V. Lorraine Huddle, *The Heights* (Belmont [Victoria] 1985), p 48.

131 Trudy West, *The Timber-Frame House in England* (Newton Abbot [Devonshire]. no date), pp 60-61.

132 Huddle, *The Heights*, figs 42, 49, 50.

133 Hasluck, *Cassell's Carpentry and Joinery*, p 49.

in 1853, moved to Mentone in 1899, and from there moved in recent years to its temporary accommodation in Collingwood. Almost every original member carries markings of two sorts. The first is a stencilled letter 'A' accompanied by a sort of star consisting of four slender leaf-like shapes at right angles. The star may have been the brand of a particular manufacturer or carpenter, and the A reference to identify the timbers for this house in particular, but the reverse is also possible. The second is a Chinese character, Most of the characters are not otherwise helpful, as they translate into words like 'gold', 'birth', 'beauty', 'water', and 'road', but there are some which might be construed as instructions, such as 'double', 'connection', 'secure', and 'fixed' and there is one proper name, 'Lee'. In some cases the characters of adjoining members match at the junction, suggesting that they were intended as a guide to assembly, though as the match is in other cases not found, the instructions cannot have been closely adhered to.