5.10 Joinery

a. the context
b. sash windows
c. reversible sashes
d. sash balances
e. casement windows
f. transom lights
g. room dividers
h. H D Annear
i modernist joinery
j. built-in furniture

a. the context

The details of joinery concern us here only upon a rather selective basis. Joinery as overwhelmingly traditional and British, inculcated not only by the training of the joiner himself, but by a number of standard texts which were available in the colonies. In one case, however, the author of such a text actually emigrated and practised in Australia. Joshua Jeays, who reached Moreton Bay in 1852, had been responsible for *The Geometrical Construction of the Hipped Roof*[1] and *The Orthogonal System of Hand-Railing, with Practical Illustrations of the Construction of Stairs.*[2] Almost in the same category was Samuel Brees, who was the author of the *Glossary* which will be mentioned below, and who spent time in Victoria and New Zealand.

Much joinery arrived ready-made from Britain, and later from America. Robert Gouger reported:

> I took out, and they arrived in excellent condition, ten pairs of French windows, seven feet [2.1 m] high, made by Manning of Holborn, but for these I adopted a new and very profitable mode of packing. Instead of protecting them by pieces of wood roughly nailed together, I ordered cases to be made in the soundest and best manner, well dove-tailed together with panelled and moulded doors. On the voyage the fronts of the doors were placed inside; and on arrival in the colony the cases being emptied, the doors properly fixed, and the whole painted, they formed a convenient and rather goodlooking winged wardrobe, which being valued on my leaving the colony, I sold for three times its original cost..

Gouger recommended other migrants to bring doors, whether secondhand or new, only of well-seasoned wood and in narrow panels, to preclude injury from shrinkage.

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1 Donald Watson & Judith McKay, *Queensland Architects of the 19th Century* (Brisbane 1994), p 107.

2 Joshua Jeays, *The Orthogonal System of Hand-Railing, with Practical Illustrations of the Construction of Stairs* (London 1850), p 107.

Windows should be brought 'ready framed and glazed',[3] which seems an odd suggestion, as most immigrants preferred them unglazed so as to avoid breakage in transit. The glass could come in carefully packed bundles, for installation on site, or it could be dispensed with entirely and fabric used for the first few months or years, as is discussed below. It is striking that after half a century of European settlement in Australia, E G Bucknall, a migrant to the Port Phillip District in 1843, still found it desirable to bring:

> four good sized windows for a house, with the framework, hinges and fastenings all complete, each of them large enough for two, as it may best suit me: they are not glazed as they would be broken in the carriage, and as I can get glass duty free and can get it cut to the right size and putty it in myself.[4]

The importation of American joinery became substantial during the 1850s, and even after Victoria's protectionist policy had reduced the flow to that colony, a total of 28,000 American doors was sent to Australia and New Zealand during one month of 1879,[5] and doors were still being imported at the end of the century.[6] But they are not readily identifiable. Even within the United States the principles for dating doors by their mouldings, first published by Henry Mercer in 1923, have been challenged.[7] These related to examples of the eighteenth and early nineteenth century, and one would not expect it to be so easy to categorise the great variety of joinery produced in the later nineteenth century. In Australia it is made harder by the fact that one is dealing with doors of American, British and local origin.

Another aspect which is difficult to document is the re-use of fittings from ships. It was common until the mid-nineteenth century for first and intermediate class passengers to have their own carpenter fit up their cabins for the trip to Australia, and for them to remove the components on arrival, especially when the ship might be returning to Europe with cargo in place of passengers. One example was the cottage built by Dr C G Everard at Holdfast Bay [Glenelg], South Australia, in 1836, with 'interior fittings of deal, which on board ship were our bed places'.[8] The hotel at Robe in South Australia has small doors thought to have been from ships. At Blood's Cottage, Box Hill, near Melbourne, the doors are rather small, and again look as if they may have been removed complete from ships' cabins. At 'Woodbine', Port Fairy, Victoria, many of the roof timbers are clearly recycled from elsewhere. They have one or more arrises finished in a bead or bowtell mould, which seems also to be a common characteristic of ship's fittings.

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3 Robert Gouger, quoted in Penelope Hope [ed], *The Voyage of the Africaine* (South Yarra [Victoria] 1968), pp 27-8.

4 E G Bucknall to Stephen Bucknall, 19 April 1843, in Graeme Bucknall & Lorna McDonald [eds], *Letters of an Australian Family, 1827-1880* (Carisbrook [Victoria] 1994), p 55.

5 *Californian Architect and Building News*, I, 8 (August 1880), p 73, quoted in Peter Barrett, 'Building through the Golden Gate: Architectural Influences from Trans-Pacific Trade and Migration between Australia and California 1849-1914' (Master of Planning & Design, University of Melbourne, 2001), p 66.

6 Barrett, 'Building through the Golden Gate', p 85.

7 G F McNulty, 'Henry C. Mercer and Dating by Mouldings', *APT Bulletin*, X, 4, pp 3-19.

8 Charles Everard to his sister, 29 May 1837, SA Archives A290B3, quoted in Hope, *Voyage of the Africaine*, p 133, and in *Proceedings of the Royal Geographical Society of Australia (South Australian Branch)*, V, 77, quoted in Colin Kerr, *'An Exelent Coliney'* (Adelaide 1978), p 68.

Some local inventions and innovations are referred to below, but we may mention here Daniel's Patent Doorseal, patented but not necessarily invented by John W Daniel of Marino Rocks, South Australia. It was an unremarkable device which consisted of a rubber flange fitted onto the bottom of the door, and a pair of aluminium sections fixed to the threshold.[9]

b. sash windows

Early sash windows[10] were almost universally divided up by glazing bars for reasons to do with the economy of crown glass production, the British excise duty, and transport constraints, all of which will be discussed below. By the middle of the century, and in houses especially, there was a hierarchy in which sashes in important locations might have a single sheet of glass and secondary windows a single division, while minor windows retained the traditional six lights per sash. There was also a change in the profile of the glazing bar in which the thicker Georgian form was replaced by the narrower and sharper lamb's tongue profile. Thus a specification in 1879 required '2" wrot molded deal Lambs tongue Sashes double hung.'[11] A range of sash types were used in Australia prior to the general acceptance of the double hung type. A schoolhouse built in 1839 had fixed lower sashes, and 'the upper sash to be hung with pivots with proper cords and fastenings to open and shut them'.[12] This is a refinement of the hopper window, a type said to have been first used by Whitehurst of Derby at St Thomas's Hospital, to obtain ventilation.[13]

Primitive sash windows might simply rise into the wall space above,[14] and in earlier or humbler buildings sashes were often not counterweighted, but held up by props or pins. An interesting refinement is found in the kitchen wing of 'Memsie', Bridgewater, Victoria, probably of the 1850s. To stop the upper sash dropping the channels below on either side are filled with timber battens. However each of these battens has a hinge at the centre and a knob at the top, allowing the top half to be pulled outwards and folded down, so that the upper sash can descend half way.[15] In a house at 26 Finch St, Beechworth, are two windows using the same device, except that it is more like the top quarter than the top half of the batten which folds down. One is in the front portion of the house, of perhaps about 1865, and the other in a slab building at the rear which dates from the 1850s, but not necessarily original to it.[16] At the manager's house behind the former Bank of Victoria, Yackandandah, thought to

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9 F W Ware & W L Richardson [eds], *Ramsay's Architectural and Engineering Catalogue* (Melbourne 1954), § 24/8.

10 For the origins of the type see H J Louw, 'The Origin of the Sash-Window', *Architectural History*, XXVI (1983), pp 49-72.

11 G R Johnson, 'Bill of Quantities Metropolitan Meat Market, Bank, Hotel, and Two Shops, &c' (Melbourne 1879), p 12.

12 [Joseph Burns], 'Specification of sundry works required to erect and complete a School-house, in connection with the Presbyterian Church, Melbourne, according to the accompanying plans,' in Michael Cannon [ed], *Historical Records of Victoria*, III (Melbourne 1984), p 517.

13 Brian Roberts, *The Quest for Comfort* (no place or date [London 1997]), p 20.

14 Tony Dingle, 'Our House' [typescript 1997], p 1, discussing his cottage at 9 Reef St, Maldon.

15 Inspected 2004.

16 Inspected 2005.

be of the 1850s, one of the front window stops is of the long or Memsie type, and the other of the short or Finch St type.[17] Another device for holding up an unweighted sash is a hook fixed by a pin to the inner to the inner face of the sash such that it can be rotated to engage with a notch cut into the window frame.[18]

An unusual version of the double hung sash can be reported at a house in the Melbourne suburb of South Yarra.[19] This is a structure of about 1853, consisting largely of New Zealand timber, and possibly prefabricated there. The two windows in question have been converted to doors, but sufficient evidence remains to show that there was no boxing for the sash weights, and indeed that the sash ran directly against the structural stud on either side. The cords passed over pulleys set in the top of these studs, and the weights must have hung in the adjoining wall cavity. How they were kept from dragging against the back of the studs is unclear, but this might easily have been achieved by means of another set of pulleys.

Sash weights were generally of cast iron, though cast lead weights were specified for the National Mutual Insurance Building, Melbourne, in 1890,[20] and W S Law was at pains in 1891 to specify lead weights to 'all sashes glazed with Art or Plate glass'.[21] This was probably meant to ensure a softer impact in the case of any mishap, and thus avoid damaging the more expensive glazing (which in this case included curved plate). By 1897 Law was practising in Capetown, South Africa, having been driven out of Victoria by the depression, but he ordered windows from B Fisher of Melbourne for five houses he was building.[22] Unfortunately we do not know what special advantage they had to justify this. In the 1870s Hudson Brothers of Sydney advertised as patentees of the 'Self-Acting Window Sash' but - whatever it was - it had probably been invented in Britain, and the London cabinetmaker J F Meakin, patentee of the 'self-acting sash fastener and opener', in 1880 supplied 'Martindale Hall', South Australia, with forty-five of his devices, in addition to gun metal pulleys, tubular sashline holders and other equipment.[23]

Sashes were usually carried on cord. A good British make was said to be Buckingham's, which was made of plainly separate threads twisted together, whereas cheaper brands sometimes looked 'like mere tow' when untwisted.[24] A 'patent sash cord' was specified for a bank in South Australia in 1878,[25] probably referring to 'Austin's New Imperial Patent Superfine Flax Sash Line'.[26] In fact Austin's sash and

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17 Inspected 2005.

18 The first window at Finch Street has this on the inside, with five neatly cut and evenly spaced notches, to allow the sash to be held at various heights.

19 13 Chambers Street, drawn to my attention by Andrew Muir.

20 Wright, Reed & Beaver, 'Specification for Erection of Premises for the National Mutual Life Association of Australasia. Corner of Collins & Queen Streets Melbourne' (Melbourne 1890, p 22.

21 W S Law, 'Specifications of Residence Drummond St. Carlton for Mrs. L. Abrahams' (Melbourne 1891), p 14.

22 *Building, Engineering and Mining Journal,* 2 March 1897, p 56.

23 Elizabeth Warburton, *Martindale Hall* (Adelaide 1979), p 142.

24 Edmund Beckett, *A Book on Building* (London 1876), p 209.

25 G Dunstan & W Sarat, 'Specification for the Several Works required in the Erection of Banking Premises for the Bank of Australasia, Kooringa' (Aberdeen [South Australia] 1978), pp [5-6].

26 *Building News,* 20 April 1888, p xxiii.

blind lines came in four different qualities of flax, in addition to the 'new imperial patent flax sash line for heavy weights.'[27] Wright, Reed & Beaver in 1890 called for 'brass axle pulleys best white lines';[28] and Guyon Purchas in 1892 specified 'best deep Sealines' with brass-faced axle pulleys and iron weights.[29] Other architects generally specified something similar.[30] In 1928 Albion Walkley specified 'Silverlake lines', with brass-faced axle pulleys and iron weights.[31] A good hemp sash line, either plaited or twisted, would reportedly last as long as copper.[32] W S Law specified 'Italian sash cord' for his windows, except the very heaviest, where he used 'patent copper sash line'.[33] A pair of shops in 1881 were specified to have what appears to be brand, 'Secure' sash fasteners and lifts,[34] but what these were is not apparent.

Some cords were reinforced with metal. The 'patent golden eagle line' was braided with a twisted copper wire centre,[35] and there was a 'Metal-Protected Waterproof (M.P.W.) Sash Cord' made by William Tonks & Sons of Birmingham.[36] Others were made totally of metal. Two by Newall's were the 'copper wire cord and wire strand', and the Newall's patent improved iron wire rope.[37] In 1908 Mayes listed copper cord for sash lines and other purposes, in sizes from 1/4 inch to 1.1/8 inch [6.5 to 28.5 mm] circumference, or about two to nine millimetres diameter.[38] These bands may have been those to which Beckett referred in 1876 as a recent invention, 'a pair of narrow steels wrapped round with copper wire', and which he thought clearly undesirable because of the friction between the two metals.[39] In 1879 a Melbourne office building was to have rear ground floor windows 'double hung to beaded + boxed frames upon brass axle pulleys having patent steel or copper bands (No.2) Wright's patent spring fastenings and brass sash lifters.'[40] Tonks also made or sold 'Hookham's Steel Ribbon Sash Line'.[41] Windows with what look like steel bands survive in the Methodist Sunday School in Grant Street, Colac, Victoria, of 1925-6. The bands pass

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27 John Gwilt [revised Wyatt Papworth], *An Encyclopaedia of Architecture* (London 1899 [1842]), p 721, § 2260.

28 Wright, Reed & Beaver, 'Specification for National Mutual Life', p 22.

29 Guyon Purchas, 'Estimate for New Residence and Stabling Boisdale Estate near Maffra Gippsland for A.M. Foster Esqre' (Melbourne 1892), p 9.

30 Hyndman & Bates, 'Specification, &c, Villa Residence Tank +c / Camberwell / Arthur J Fuller Esq / Normanby Chambers Chancery Lane' (Melbourne 1890), p 17, call for 'best brass cased axle pullies approved deep sea lines', and 'deep sea lines' are also specified in Reed, Henderson & Smart, 'Specification of Work to be done ... New Premises for the Metropolitan Gas Coy.' (Melbourne 1890), p 52.

31 A H Walkley, 'Specification for Brick Residence Riversdale Road Hawthorn for E.V. Jones Esq.' (Melbourne 1928), p 17.

32 Beckett, *A Book on Building*, p 209.

33 Law, 'Specifications ... for Mrs. L. Abrahams', p 14.

34 'Supply all ... Two Shops + Dwellings to be built in Bay St Brighton for John Kelly Esqre Est Brighton' (Brighton [Victoria] 1881), p 6.

35 Gwilt *Encyclopaedia of Architecture* (1899), p 721, § 2260.

36 F T W Miller, *Lockwood's Builder's and Contractor's Price Book for 1889* (London 1889), p xviii.

37 Gwilt *Encyclopaedia of Architecture* (1899), p 721, § 2260.

38 C E Mayes, *The Australian Builders & Contractors' Price Book* (7th ed, Sydney 1908), p 201.

39 Beckett, *A Book on Building*, p 209.

40 F M White, 'General Conditions of Contract and Specification ... Certain Offices in Queen Street Melbourne ... F. W. Prell Esqre' (Melbourne 1879), p [14].

41 F T W Miller, *Lockwood's Builder's and Contractor's Price Book for 1889* (London 1889), p xviii.

over pulleys in the usual way, and it is impossible to see whether are attached to weights or to some sort of spring mechanism.[42]

The use of metallic chains for the hanging of sash windows was favoured in Britain,[43] and these were made R. & C. Harcourt & Son of Birmingham. An advertisement for Harcourt's sash chain shows something that looks like a bicycle chain, with alternately three and four parallel links.[44] Such chains have been reported in the former CBCS Bank in Beechworth, Victoria,[45] and at the branch of the Australian Joint Stock Bank in Mosman Street, Charters Towers, Queensland, built in 1890 to the design of F D G Stanley. There it may have been thought a necessary measure to avoid rotting cords. Surviving chains of about 1901-6 are found at William Pearson's 'Kilmany Park', Victoria, with alternating two and three-ply links. The same chains are found in Pearson's town house, 'Craigellachie',[46] though it is not clear when they were installed. Metal chains were still being made in the United States in the 1920s, with links formed from rolled steel or other metals.[47] Conventional cords, however, remained the norm in Australia until they were challenged by the Unique sash balance and similar devices at about the time of World War II. That challenge engendered an unprecedented degree of cooperation between eight leading cord makers, who advertised jointly in 1949 as The Sash Cord Manufacturers of Australia'.

The telescopic sash, designed to allow for walking through a double hung sash opening, is not a specifically Australian characteristic, but it is sufficiently prevalent to be worthy of comment, and a specification of 1888 for the Lands Office at Rockhampton is therefore of interest:

> One sash ... to open down to floor level with double hung sashes as before mentioned. The bottom sash when raised to pass up to give an opening 6 ft in height when fully raised the wall being recessed for the purpose.[48]

We will see below that the primitive idea of a sash rising into the wall cavity above the opening, was to be taken up and made his own by Harold Annear in the twentieth century. The reverse, a sash descending into the wall cavity below, is not known in Australia (though flyscreens which do this are), but it appeared as a modern idea in Europe after World War II, as the 'Swiss submerging window'.[49]

By 1941 the State Savings Bank's influence upon housing in Victoria (mainly attributable to its credit foncier scheme) was such that trade literature listed box frames for sashes to 'Savings Bank Design' in twelve sizes from 4 x 2 feet [1.2 x 0.6

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42 Inspected 2006.

43 According to Sutcliffe 'hemp, flax, steel ribbon, or zinc, copper, or steel chains' were possible, but steel or copper lines were best for heavy sashes. G L Sutcliffe, *The Principles and Practice of Modern House Construction* (1st ed, 6 vols, London 1900), I, p 159.

44 Miller, *Lockwood's Price Book*, p xv.

45 Information from Greg Owen, 2007.

46 Inspected 2001.

47 *Sweet's Architectural Catalogue* (17th ed, New York 1922), p 1191.

48 New Lands Office, Rockhampton, February 1898, Queensland Archives WOR/P9 Specifications 1891-8: quoted in a letter from Ian Evans, 4 June 1991.

49 K Cheesman, 'Glass', in Eric de Maré [ed], *New Ways of Building* (London 1958 [1948]), p 165.

m] to 4 ft 6 in x 3 ft 6 in [1.35 x 1.15 m].[50] In the 1950s Tribilt windows came in a more limited range, using 'Unique' sash balances and with quite specific aesthetic constraints. The horizontal module was three feet [0.9 m], and it was explained that in an asbestos cement wall the sheeting, also in three foot widths, should be aligned with the windows. The sashes were divided by horizontal bars at 10 1/2 inch [228 mm] centres vertically. The Type A window was designed to be set with the sill at 2 ft 7 in [656 mm], but when it had to be raised behind a sink or basin, the builder wax enjoined to raise it 10 1/2 inches, so that the glazing bars would align with those of other windows.[51]

b. reversible sashes

In Britain a number of improvements to sash windows were devised which would allow the sash to be pulled out of the frame and into the room, so that it could be cleaned without the trouble or danger of mounting the exterior of the building. These involved cutting the boxes, cutting the pulley stile, counterbalance weights for opening both sashes in one operation, and other such measures.[52] In 1812, after a window cleaner had fallen and been impaled on a fence, G Marshall of London prepared a model sash window in which the upper sash could be pulled into the room for cleaning the exterior, while the lower sash could be rotated.[53] Another concern was to facilitate the movement of the upper sash when it was more or less out of reach. In Britain Matthias Saul had in 1827 developed his 'revolving window', in which the two sashes seem to have been linked together in a way rather similar to the Austral window, discussed below.[54] One Tuely, of London, seems to have independently developed something similar.[55] An invention by C Hering of London, shown at the Great Exhibition of 1851, allowed both sashes to be taken out for cleaning, while another by T Bates allowed them to open inwards for this purpose.[56] John Theobald's invention allowed the sash to be cleaned from inside, as well as being allegedly thief proof and providing an alarm and a fire escape, though how all this was achieved is not apparent.[57]

The same quest was pursued in Australia, and ultimately with more success. At the 1866-7 Exhibition Holroyd & Ravenscroft of Melbourne displayed a reversible sash and frame, which the jurors thought ingenious but not practicable for general use.[58] In 1873 James Davis of Richmond, Melbourne, was granted a patent for 'Davis's Patent Victorian Sashes', which hung on a pivot and could be turned inside-out for

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50 Timber Merchants' Association of Melbourne and Suburbs, *Price List of Timber, Joinery, Etc 21st June 1941* (Melbourne 1941), p 18.

51 Tribilt Pty Ltd, *Catalogue of Houses by Tribilt, &c* (Port Melbourne 1958), pp 24-5.

52 'Improvements in Sashes', *Building News,* 808 (May 1884), cited in Wyatt Papworth [ed], *The Dictionary of Architecture* (London 1853-92), sv Sash.

53 *Repertory of Arts, Manufactures, and Agriculture,* 2nd series, XX, 118 (March 1812), pp 218-9.

54 *Mechanic's Magazine,* I, 17 (8 October 1823), pp 265-6.

55 *Mechanic's Magazine,* I, 22 (24 January 1824), pp 265-6.

56 London, Great Exhibition of the Works of Industry of all Nations, 1851, *Official Descriptive and Illustrated Catalogue*(3 vols, London 1851), I, p 316.

57 Great Exhibition, 1851, *Catalogue,* I, p, p 325.

58 Intercolonial Exhibition of Australasia 1866-7, *Official Record* (Melbourne 1867), pp 30, 36, 386.

cleaning.[59] At the Melbourne International Exhibition of 1880 D McPherson of Fitzroy showed 'patent sash segments',[60] though what these may have been is not apparent. The idea of a reversible sash window, in which the outer face could be turned inwards for cleaning, was to become increasingly attractive as buildings became higher and externally less accessible. Robert Adams of London, whose Australian Agents were McLean Bros, Rigg & Co of Melbourne, made a 'patent reversible and sliding window' which they showed at the Adelaide Jubilee Exhibition. It allowed the sash to be drawn inside the room for cleaning.[61] At the turn of the century English companies were marketing double-hung sash windows in which each sash contained an inner pivoting frame.[62] By about the 1930s this type seems to have gone out of use in England, for Percy Thomas writes of it as an ingenious variation 'used at one period'.[63] However something more radical had by now emerged in Australia, the 'Austral' window, discussed below.

The 'Austral Window' or 'Magic Balance Window' (the latter name is the original one) was the invention of the Toowoomba architect Harry Marks, patented in Queensland in 1902.[64] It looked much like a double hang sash window. The principle was that a pair of metal arms linked the sides of the two sashes at points about a third or two fifths of the distance above and below the meeting rails, in such a way that the movement of one sash affected the other. The bottom corners of the lower sash and the top corners of the upper sash were constrained by a track in the frame so that they could move only vertically. However the body of the lower sash was free to swing inwards like a hopper, and the upper one to swing outwards like an awning. Because of the connecting arms, the pulling in of the lower sash automatically pushed out the upper one, and they also moved closer together in the vertical direction.[65]

Marks used these windows in 1908 at his own house 'St Rest' (later 'Gladstone House'),[66] and they were also used extensively in the Parke, Davis & Co building, Sydney.[67] In 1908 the Austral Patent Window Balance with gunmetal plates was first listed in Mayes's price book in stock sizes of 13, 16 And 18 inches [325, 400 and 450 mm].[68] What was supplied to the purchaser was the metal arm mechanism and the fixing plates to attach to the frame of the window, which would otherwise be made of timber in the usual way. The Austral Window was used in the Melbourne Hospital buildings of 1910-13, and at this stage it was made in timber and with one vertical

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59 Victorian patent no 1753 to James Davis, 22 April 1873.

60 Melbourne International Exhibition, 1880-1881, *Official Record* (Melbourne 1882), p 659.

61 *Australasian Ironmonger*, 1 October 1887, p 268. See also. John Gwilt [revised Wyatt Papworth], *An Encyclopaedia of Architecture* (London 1899 [1842]), p 731, § 2260.

62 W G & L England of Barnsley: J E Sears [ed], *The Contractors,' Merchants,' and Estate Managers' Compendium and Catalogue* (15th ed, London, no date [c 1935]), II, p 209; and the NAP Company, recommended as 'about the best' in John Leaning, *Building Specifications* (London 1901), p 406.

63 Percy Thomas, *Modern Building Practice* (4 vols, London 1901), p 409.

64 Morag Papi, *James Marks and Sons, Architects, Toowoomba* (no place or date [Brisbane]), pp 22, 24, 74-6: Queensland patent no 6897, lodged 7 October 1902.

65 Drawings by J J & E J Clark, Melbourne University Archives, reproduced in Nigel Lewis & Associates, *Queen Victoria Medical Centre* (South Yarra [Victoria] 1985), p 47.

66 Papi, *Marks and Sons*, pp 31-9.

67 *Building*, [?], p 33.

68 Mayes, *The Australian Builders Price Book* (1908), p 242,

glazing bar dividing each sash, and even with horns on the meeting rail of the upper one. The Tasmanian architect Alexander North designed a house at about this time, though its location has not been established, in which the Austral window was used. The glazing pattern was quite distinctive. The upper part consisted of a single pane, more or less square, above which about the top 40% of the sash was occupied by a row of about six narrow panes.[69]

By 1906, however, the invention had reached the United States, and an Austral Window Balance Co was operating in New York under the 'Knox-Abell Patents'[70] (presumably the names of the United States assignees). The window was now used throughout the New York City Hall, the largest municipal building in the world.[71] By 1916 an Austral Window Co had been established to market these windows in New York.[72] In Britain it was manufactured by Henry Hope & Sons of Birmingham, and came to be widely used in schools and hospitals.[73] Hopes were also makers of metal windows, and they may well have been the first to make the Austral window in metal - certainly the invention was now taken up by metal window manufacturers, and by 1922 was being made in metal by at least two American companies.[74] It was recognised as an Australian invention in Crittall's *Metal Window Dictionary*.[75]

The Austral Window was not without competition even on its own territory. By 1908 A L Chavasse & Co of Melbourne were sole agents for Humphries' Patent Safety Window. So far as one can tell from the available illustration this was a double hung window in which the bottom sash (and probably the top one as well) could be leant inwards, pivoting on its base, so that the outer surface could be reached for cleaning. It appears that the whole frame carrying the sash actually broke at the centre to permit this, pulling the sash out at an angle, so that it acted as a pair of stays to support the tilted sash.[76]

d. sash balances

A new patent wooden sash slide was introduced in Sydney in 1938. It appears to have been a segmentally curved wood channel built into the frame in place of a metal pulley, so that the cord simply slid over it.[77] Its many claimed advantages - of having no rusting metal, not requiring oiling, having nothing to 'cut cords', and so on - all

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69 Photograph in the possession of Dr John North of Longstaff Street, East Ivanhoe, Victoria (grandson of the architect). Although the house is unidentified, John Maidment has advised me, 2003, that he believes that the plans are in the collection of Judith North, of Cowland North, architects, Werribee.

70 *'Sweet's' Indexed Catalogue of Building Construction* (New York 1906), p 343.

71 *Building*, 15 December 1908, p 33; also p 36 for an advertisement.

72 *Sweet's Architectural Catalogue* (17th ed, New York 1922), pp 1294-5, reproducing drawings dated September 1916.

73 Thomas Corkhill, 'Windows', in Richard Greenhalgh [ed], *Joinery and Carpentry* (2nd ed, 6 vols, London 1946), II, pp 231-2.

74 *Sweet's Architectural Catalogue* (1922), pp 799, 810.

75 W F Crittall, *A Metal Window Dictionary* (Braintree [Essex] 1953), p 2.

76 Illustration in a letterhead of A L Chavasse & Co, copy kindly supplied by Michael McCowage of Sydney, bearing a letter dated 10 December 1908.

77 *Eastern Suburbs Builders Handbook and Diary 1939* (Sydney 1939), p 69.

sound somewhat spurious. It was also claimed to reduce by about one third the weight needed to balance the sash, which does not seem a great advantage, particularly as this would have to be the result of friction, and therefore far greater wear on the cords. Unsurprisingly, the device seems to have met with little success, for no example has been reported.

It was also in 1938 that the Sydney prefabricators, Vandyke Brothers, advertised their houses - somewhat mysteriously - as having '3 *automobile* lift up plate glass windows 3' x 1'6" width with fly shutter, no weights.'[78] The 'automobile' seems likely to have been one of the varieties of spiral sash balance such as were already in use overseas,[79] as probably were 'Grove's Patent Spring Balances for Solid Frames' advertised in the same year.[80]

Window sash springs have a long but somewhat obscure history. When introduced in North America in the 1770s they were said to be a new fashion from England, and were used at Jefferson's houses at Monticello and Poplar Forest, and became quite ubiquitous in Virginia.[81] On 7 September 1802 Leonard Kennedy applied for a patent for fastening, raising and supporting window sashes.[82] In July the following year a group of joiners in and around Portsmouth, New Hampshire, bought the rights to Kennedy's patent window springs for Rockingham and Strafford counties and for Maine. The springs allowed the upper and lower sashes to be supported open at any desired height. Some sash springs are reported to survive at the Wentworth-Coolidge house in Portsmouth. They are described as leaf springs, apparently of tempered steel, and similar to the springs used in rim latches and gun locks in the early nineteenth century. They are attached to the window frame with screws, and engage with notches cut in the sides of the sash at convenient intervals. They are depressed sideways by pushing on a forged knob at the protruding end of the spring, thus freeing the sash to move up or down.[83] The use of knobs suggests that these are in fact Kennedy's springs, for in 1804 Stephen Brown, a Richmond gunsmith, advertised that he had bought Kennedy's patent rights for 'fastening, raising, and supporting Window Sashes by Springs and Knobs.'[84]

The 'Unique' sash balance was a much later American invention, but after World War II it was manufactured in England by the Unique Sash Balance Co of Yeovil, Somerset. It consisted of a coiled spring enclosed in a tube of about 16 mm diameter, to which was fixed a 'variable twisted rod and sash attachment', the latter designed to be fixed into the underside of the lower rail of the sash. The spring could be adjusted to suit the weight of the sash, up to 25 kg, and for greater weights multiple springs were used.[85] After World War II the 'Unique' was used in Australia in 'Narroline'

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78 C E Mayes, *The Australian Builders' and Contractors' Price Book* (10th ed, Sydney 1938), p 21.

79 Crittall, *Metal Window Dictionary*, p 56.

80 Mayes, *Australian Builders' Price Book* (1938), p 103.

81 Email from Travis McDonald on the Vernacular Architecture Forum web site, 31 March 2004.

82 Email from W S B Smith on the Vernacular Architecture Forum web site, 30 March 2004.

83 Email from Jim Garvin on the Vernacular Architecture Forum web site, 2 April 2004.

84 Email from W S B Smith.

85 Cheesman, 'Glass', p 166.

windows,[86] and seems to have emerged as the prominent sash balance, but seem to have been made locally, in factories in Melbourne,[87] and then in Sydney.[88] By 1948 Unique balances were also used in the 'Renown' windows of H Beecham & Co[89] and the 'Tribilt' windows of Triton Constructions.[90] By 1949 they were also a feature of Dowell steel windows.[91] In 1958 Tribilt Pty Ltd was making windows for its own houses, still using the Unique balance, said to 'eliminate clumsy, noisy sash weights'.[92]

Watson Sharp does not mention the 'Unique' or any other specific brand, but discusses the general category as a 'balanced sash window'.[93] It was a system which replaced the weights in a double hung sash window by a spiral spring packed in grease in a tube on either side of the sash, within the opening itself and accommodated by a curved rebate in the side rail of the sash. By the 1950s there were two other brands. One was the 'Seemore',[94] and the other the 'Invizible' (later 'InviZible') in which, as the name implies, no tubes or rods could be seen, as all the mechanism was contained in a groove in the style of the sash.[95] On the other hand the 'Kleervue' windows, made by J Connolly of Sydney (who held rights for New South Wales and Queensland) had no mechanism at all, but consisted of simple unframed sheets of glass, apparently supported only by friction.[96]

e. casement windows

The casement window was a traditional type, common in the middle ages, and appearing in the seventeenth century paintings of Jan Vermeer. It had been eclipsed in the Georgian period but returned, more or less unremarked, with the Gothic Revival.

Malton's *Essay on British Cottage Architecture* of 1798 illustrated designs using casement windows exclusively. Though he discusses the arrangement of the openings, and the design of the glazing bars within each sash, Malton does not feel called upon to justify his complete rejection of the double-hung sash.[97] The first to

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86 F C Bloomfield, *The Australian Carpenter and Builder* (3 vols, Melbourne, no date [c 1950]), II, pp 41-3, 525-6.

87 The Melbourne factory was at Smith and Barnett Streets, Kensington: *Australian Home Beautiful*, August 1947, p 55. See also W H Hallam, *Building Costs* (2nd ed, Melbourne 1947), p 2.

88 Royal Australian Institute of Architects WA Chapter, *Exhibition 1949 Catalogue* (Perth 1949), p 46; F W Ware & W L Richardson [eds], *Ramsay's Architectural and Engineering Catalogue* (Melbourne 1949), § 33/4. See also *Ramsay's Catalogue* [1954], § 33/12.

89 *Australian Home Beautiful*, October 1947, p 48. See also Wentworth & Richardson, *Ramsay's Catalogue* (1949), § 24/1.

90 *Australian Home Beautiful*, October 1948, pp 76, 81.

91 *Ramsay's Catalogue* (1949), § 21/2.

92 Tribilt, *Catalogue of Houses*, p 24.

93 W W Sharp, *Australian Methods of Building Construction* (Sydney 1946), p 152.

94 *Ramsay's Catalogue* (1954), § 33/11.

95 *Australian Home Beautiful*, June 1955, p 8; July 1956, p 76; May 1958, p 100.

96 *Ramsay's Catalogue* (1949), § 24/1.

97 James Malton, *An Essay on British Cottage Architecture* (London 1798), pp 16-17.

give some reason for the change is Edmund Bartell in 1804, who prefers the casement to the Gothic or pointed window:

> It is a general and fashionable custom to fit up a cottage with Gothic windows: I do not, however, think either the pointed window, or the sash, altogether consistent with the simplicity of the building ... I trust I shall not be thought inconsistent in rejecting sashes, as foreign to the purpose. The common casement, divided into three parts, and of greater width than height, appears to be most in character with such buildings as are now under consideration.
>
> This kind of window need not be adopted, to the exclusion of either light or comfort; let it, if required, be of ample dimensions, with squares of glass neither small nor ordinary. It has a good effect if the frames be massy, and even the light divided by the old fashioned munnions; and if not oak, they should be painted to represent it.[98]

Laing and Lugar[99] use both the sash and the casement window promiscuously, while J B Papworth, though favouring the casement, does not use it exclusively.[100] Loudon says that he does not like 'latticed windows', which he seems to equate with casements, 'because they are cold and gloomy', but they are much cheaper than sashes hung with cords and pulleys, so must be used when economy is important.[101] However Pugin used casement windows in banks of three in his extensions to Scarisbrick Hall, where economy cannot have been a prime consideration. The French window is a special type, determined more by fashion than technology, and it is discussed below in the context of the verandah. It is enough to say here that it is essentially a Regency form, hardly known in England before 1800, but in Australia had a long life and may be found, for example, in hotel upstairs bedrooms as late as the 1880s.

In Australia casement windows were widely used in Gothicising buildings by the 1840s, notably in Charles Laing's 'Coryule', Drysdale, Victoria, of 1849-50. Henceforward it was kept alive by the influence of medievalists up to and including R N Shaw, but it never attained the importance which it held in the United States in the circle of Frank Lloyd Wright.[102] It enjoyed something of a revival in Queensland in the early twentieth century. As A B Wilson sensibly argued, it allowed the whole window space to be opened, rather than only half, as with a double-hung sash window: moreover the casement sashes could be used like wind sails to channel the air into the opening.[103] However, in general long banks of casement windows were

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98 Edmund Bartell, *Hints for Picturesque Improvements in Ornamented Cottages, &c* (London 1804), pp 26-7.

99 D Laing *Hints for Dwellings, Consisting of Original Designs for Cottages, Farm-Houses, Villas, &c* (London 1804), passim; Robert Lugar, *The Country Gentleman's Architect* (London 1800), passim.

100 J B Papworth, *Rural Residences, &c* (London 1818), passim.

101 J C Loudon, *An Encyclopædia of Cottage, Farm, and Villa Architecture and Furniture*(London 1846 [1833]), §307, p 154.

102 Paul Kruty, 'Wright, Spencer, and the Casement Window', *Winterthur Portfolio,* XXX, 2-3, pp 103-127.

103 A B Wilson, 'Domestic Architecture for Tropical and Subtropical Australia', in Second Australian Town Planning Conference, *Volume of Proceedings* (Brisbane, no date [c 1918]), ****.

more a characteristic of New Zealand. One of the few significant distinctions between New Zealish and Australian buildings is that the Whitney Casement Window does not appear in Australia. This was a 'sliding out-folding casement window' prevalent in New Zealand in the 1920s and 1930s, which was used in horizontal banks, and which could be cleaned on both sides from inside the house.[104]

f. transom lights

Openable transom lights are by no means an exclusively local characteristic, but they are especially common in hotter areas such as Queensland, to maintain through ventilation. One of the earliest specifications for fanlights is that for a Melbourne office building in 1879, where they were to be hung 'having cords Hooks pulleys and steel Car Quadrants as directed.'[105] At the International Exhibition of 1880 D McPherson of Fitzroy showed a 'new method of opening, closing, and locking fanlights, and P Williams of Melbourne showed a patent fanlight opener and fastener.[106] One of the earlier patent applications was made in Victoria in 1889 by Percy Clapperton and Joshua Alexander Kay[e] of Melbourne, for an improved fastener for windows, fanlights, &c,[107] but whether this came onto the market is not known. A 'Hill's Patent Opener' was specified for the transom light of the National Mutual Life building in Melbourne, of 1890-3, and the same opener was used for the basement windows, which were apparently hoppers.[108] In Western Australia 'Preston's patent fanlight' is found at the Albany school, of 1895.[109] In the construction of the Government Offices ['Treasury'], Brisbane, completed 1890, it was specified:[110]

> All hung fanlights of doors, casement doors, or casements to have 3-inch brass butts and McFarlane's patent brass quadrants to suit the pitch of opening; cost 10 s. each. The swinging fanlights to have brass-faced pivots, with steel pins in bell-metal to cleats, brass spring-fasteners and pulleys.

Also in Queensland, Robert Riddell has noted one type of transom light with a remote control mechanism operated at hand height, which he has found especially in the work of the architect T R Hall, though whether it was locally made or used by Hall

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104 Henderson & Pollard Ltd, *Use Better Doors* (Auckland 1930), unpaginated; Kauri Timber Co Ltd, *From Bush to Bungalow* (Auckland, no date [1933]), unpaginated.

105 White, 'Specification, Offices for F W Prell', p [14]; see also p 12.

106 Melbourne Exhibition 1880-1881, *Official Record,* p 659.

107 A B Wilson, 'Domestic Architecture for Tropical and Subtropical Australia', in Second Australian Town Planning Conference, Volume *of Proceedings* (Brisbane, no date [c 1918]), pp 144-5.

108 Wright, Reed & Beaver, 'Specification for National Mutual Life', pp 19, 22.

109 *Australian Advertiser,* 1 May 1895, quoted in Ray & John Oldham, *George Temple-Poole* (Nedlands [WA] 1980), p 29.

110 *Specification of the Materials and Works required in the erection of Public Offices, Brisbane, &c,* 1886 (held by the Historic Buildings Branch, Brisbane).

exclusively we do not know.[111] Nor do we know whether it was a British or a local patent, though it bears the mark:

PAT
JUNE
1899

At 'Craigmoor', Hill End, New South Wales, which may date from the 1890s, the fanlights are operated by rods, with a finger push at the base of each labelled:

[upward arc
SOLID
]
GRAY

In 1907 a specification by Hall & Dods for a house in Bowen Terrace gives what may be another maker's name, though it is not entirely legible:

> *Fanlights* over all doors height required to range with windows, or as shown, molded and prepared for glass hung on pivots complete with F. [?llecks; ?Hecks] fasteners.[112]

James Cartland & Son of Birmingham advertised the 'Invisible' patent sash fastener locally in 1906.[113] In 1917 Colton, Palmer & Preston Ltd of Adelaide stocked one branded 'Cartland's Patent' based on a horizontal worm controlled by a vertical cable; another based on a combination of rods and named 'The Reading Coy's Transom Lift'; a simple curved notched quadrant called 'Beanland's Japanned'; and three which were suitable either for fanlights or casements, the 'Convertible', the 'Everedy II', and one other. Other documented British types are the Robert Adams 'Link' pattern;[114] Preston's screw adjustment; Beanland's quadrant; Leggott's system; Loach's 'Eclipse',[115] or the '"King" Patent Covered Screw Fanlight Opener', which was still being marketed in England in the 1930s.[116] By 1913 James Moore & Sons of Melbourne were selling Beanland's and Preston's, the latter in either bronze or brass.[117] Preston's was later sold by D & W Chandler of Melbourne, together with the 'Ouvro', of unspecified origin.[118] Russell, Erwin & Co, of the USA, produced a range of 'transom lifters' or long rod control mechanisms.[119] Although none has so far been

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111 Information from Robert Riddell, including a rubbing of the inscription from his own house, 521 Brunswick Street, Fortitude Valley, 1991.

112 Hall & Dods, 'Dwelling house of wood, Balfour Street, Bowen Terrace', November 1907 (in the possession of Robert Riddell).

113 *The Australasian Handbook* (London 1906), advertisements, p xxi. See also Sears, *Compendium and Catalogue* (1901), p 225.

114 Sears, *Compendium and Catalogue* (1901), p 223; *Laxton's Price Book for Architects, Engineers, Builders and Contractors* (1904), advertisements p xxxiv.

115 Sears, *Compendium and Catalogue* (1901), pp 225, 226, 228.

116 J E Sears & J E Sears [eds], *The Architects' Compendium and Annual Catalogue* (London 1936), p 592.

117 James Moore & Sons Pty. Ltd, *Price List 96 August 1913* (Melbourne 1913), p 4.

118 D. & W. Chandler Ltd., [catalogue] (Melbourne no date [?c1928]), p 100.

119 Russell & Erwin Mfg. Co., *Builders' Hardware made by Russell & Erwin Mfg. Co.* (New Britain [Connecticut] 1897, pp 243-9.

reported, it is likely that these also reached Australia, as did others of the company's products.

g. room dividers

The greatest feats of internal joinery, as opposed to windows, tend to be the folding or lifting doors which often connect major rooms, but so far as we know there is nothing distinctively local about them. They seem to date mainly from the late 1860s onwards, though Captain J C Wickham installed folding doors between the two largest rooms of 'Newstead House', Brisbane, probably soon after he acquired it in 1847. This was to permit him to entertain in a manner befitting the Governor's representative in the town.[120] John de Pass's house in Melbourne, built in 1859, had conventional folding doors which enabled the drawing room and breakfast parlour to be thrown together to create 'a magnificent room'. In the main block of 'Como', Melbourne, of the mid-1850s, there were two upstairs rooms 'with folding doors which can be drawn up through the roof'.[121]

The best information on lifting (or what he calls 'sliding') doors comes from W S Law's specification for 'Benvenuta', Melbourne, of 1891:

> Frame sliding door to divide Dining an Breakfast rooms, with 2" Dry clear Pine, top and bottom panels circular ended with bulleye centres, 2 1/2" bolection mouldings on both sides. Strong wrot iron straps with hooks and eyes fastened with nuts and bolts and 2 1/2" screws to be fastened to door. Provide three 1/2" bolts placed in grooves of styles from top to bottom rail with nuts and bolts ... Provide 4" x 3" [illegible alteration] deal frame for door to work upon, two rebated slips to be provided to fit in the groove each side [sketch]. All the above to be made and hung to detail as directed.

Elsewhere, under 'Ironmonger', Law explains the mechanism in more detail, and sketches it. The top of the door is formed up to a king post truss of T iron (always invisible from the room), and from the centre of this truss a king bolt descends right down through the door to a plate at the bottom, preventing it from sagging and distorting. The styles forming either side of the door rise above it a little way as horns, and to each of these horns side clamps are fixed using half inch [13 mm] bolts. The side clamps carry eyes into which the chains for the counterweights can be connected. These chains are of 'three ton test' cable chain and rise up over 300 mm pulley wheels. At the other end are cast iron 'adjusting weights' to which pieces can be added or removed once the final weight of the door is determined.[122]

h. H D Annear

It was at about the same time that the Melbourne architect H D Annear devised the window which he purported to have patented, and which he used in most of his

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120 Clem Lack, *Newstead House* (Brisbane., no date), p 11.

121 *Argus*, 6 December 1864.

122 Law, 'Specifications ... for Mrs. L. Abrahams', p 14, pp 16, 27.

houses. It is a single sash which slides upwards into a boxing on the inner side of the wall overhead. It is usually banked in groups of two or more, so that it has more the appearance of a group of casement windows, and it may be protected with a louvred shutter which slides upwards in the same way. Each sash or shutter has a single counterweight, which moves up and down within the overhead boxing, rather than at the side of the opening, and is ingeniously designed to be double the weight of the sash and to travel half the distance.[123] This sounds, at least, similar to a nineteenth century British device, conceived by William McAdam, 'whereby one weight can be made to answer the same purposes as two applied in the usual way.'[124] Annear argued that:

> It is unsafe to make the ordinary double-hung sash less than 1½ inches thick - the standard size. But if we adopt a single-hung sash running up into a pocket in the wall above the window, and make them [*sic*], say, 3 ft. to 3 ft. 6 in. wide and 3 ft. to 4 ft. high, this can be made as light as three-quarters of an inch thick. Then with a single weight twice that of the sash and glass (or wire) contents the effort of raising or lowering of these windows is reduced to a minimum.[125]

Another of Annear's inventions was the 'Patent One-Slab Door' which, like his window, was not in fact the subject of a patent.[126] This resembled a ledged door made of thick vertical planks, typically three in number, but with the ledges let flush into the inner face, in a dovetail section, rather than planted onto it. The outer face was entirely flush, and designed to show off the quality of Australian timbers, while the inner face might have a moulding planted around the perimeter.[127] An early example of this general type is a door at Westminster Abbey, thought to date from about 1055-1066. Here the ledge is not dovetailed in section, but it is let in flush with the boards, and its sides are gently curved so as to waist in at the centre.[128] A closer relation is what was known in the nineteenth century as a 'key'. The main differences are that the key tapered evenly along its length, and was not let in far enough to be entirely flush. It was defined by Samuel Brees as:

> a tapering piece of wood, usually of about 2½ or 3 inches [64 or 76 mm] wide, by ¾ or 1¼ inches [19 or 32 mm] thick, which is dovetailed on to the back of a series of boards, passing transversely across, for the purpose of holding them together, and preventing their twisting or warping.[129]

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123 H Desbrowe-Annear [ed], *Every Man's Home* (serial, Melbourne 1922-3), pp 50-51.

124 Joseph Gwilt [ed Wyatt Papworth], *An Encyclopædia of Architecture* (London 1899 [1842]), § 2165a, pp 662-3.

125 H D Annear, 'Windows', *Australian Home Beautiful*, 12 January 1926, p 19. Drawings for these windows appear on pp 52-3.

126 Harriet Edquist, *Harold Desbrowe-Annear: a Life in Architecture* (Melbourne 2004), p 226.

127 C A Hewett, *English Historic Carpentry* (London 1980), p 26. Hewett also illustrates, p 46, a door at Kempley Church, possibly about 1100, with the ledges either fully or partly let in, but again, not dovetailed in section.

128 Desbrowe-Annear, *Every Man's Home*, p 49.

129 S C Brees, *The Illustrated Glossary of Practical Architecture and Civil Engineering* (London 1853), p 237. The device had been illustrated, without any real explanation, in Jean-Baptiste Rondelet, *Traité Théorique et Pratique de l'Art de Bâtir* (6 vols, Paris 1812-17), pl ‼ , fig 3.

Precisely the same system of dovetailed keys was used in eighteenth century America for painting boards, which were used by artists in place of canvas,[130] and something approaching it is described in Papworth's *Dictionary of Architecture*,[131] and is illustrated in *Cassell's Carpentry and Joinery* as late as 1912, and in the American Technical Society's, *Architecture, Carpentry and Building.*[132] Here, the ledges are only partly recessed, but the sunk part is dovetailed.[133] Annear's most probable source, however, is Viollet's *Dictionnaire,* which claims that such a technique was used in France from about the fifteenth century, and had indeed been used in ancient Egypt. Viollet illustrates a version with a ledge let in half way, and another with it let in flush and dovetailed in section, though unlike Annear's in that it is uniform along its length rather than tapering.[134] Annear's one slab doors are found frequently in his buildings, and must have been devised in about 1916, for when he published the design in 1922 he said that they had been in use for six years.

i. modernist joinery

After World War II the timber equivalent of the metal and glass curtain wall was a glazed wall in a continuous grid of timber framing. It was popularised by the architect Robin Boyd, who used it when in the partnership of Boyd, Pethebridge & Bell, in buildings such as the Howard Pettigrew house, Kew, additions of 1945, and the R H Ernst house, Kew, of 1947. In 1952-3 he designed the canonical version for Brian Stegley, who had a joinery business, and manufactured it by 1956 as the 'Stegbar Windowall'.[135] It claimed to be cheaper than almost any other form of wall construction, capable of infinite combinations, and strong. The strength (it was alleged) resulted from the fact that every framing member was continuous for its full length, with the transoms and mullions crossing in a 'patented halved joint'.[136] It was originally made of kiln-dried hardwood, but in the 1960s Stegley changed over to western red cedar.[137] By 1959 there were offices in Victoria, New South Wales, Queensland and South Australia.[138] In Sydney Harrison's Timber Pty Ltd produced the rival 'Moduline Window Walls'.[139]

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130 Eric Sloane, *A Reverence for Wood* (New York 1973 [1965].

131 Wyatt Papworth [ed], *The Dictionary of Architecture* (London 1853-92), sv Key.

132 F T Hodgson et al, *Architecture, Carpentry and Building* (5 vols, Chicago, 1925-6 [1910]), I, p 78.

133 P N Hasluck [ed], *Cassell's Carpentry and Joinery* (New York 1912), pp 64-5.

134 Eugène-Emmanuel Viollet-le-Duc, *Dictionnaire Raisonné de l'Architecture Française de XIe au XVIe Siècle* (10 vols, Paris, 1854-68), VI, pp 347-8, the text of which translates as:
'In order to join boards together tongues and grooves were not used until quite a late date (toward the fifteenth century). They were joined by means of dovetailed keys let halfway in ... by ledges let in and pinned; or by strips entirely let in, or by pegs of hardwood, or even of iron. These basic types have been used all the time. Indeed wood was in ancient Egypt assembled in these ways.'

135 Geoffrey Serle, *Robin Boyd: a Life* (Melbourne 1995), p 182.

136 *Australian Home Beautiful,* November 1956, p 76; Royal Victorian Institute of Architects, Small Homes Service, *Home-Builders Handbook '57* (Melbourne 1957), p 17.

137 Information from Neil Clerehan, 2005.

138 *Architecture in Australia,* September 1959, p 30.

139 Master Builders' Association of New South Wales, *Guide Book to Parade of Homes* (Sydney no date [c1959]), p 26.

Modernism caused a revival of flush panel doors, which was a boon to the plywood industry, and in 1936 'Standis' dry glue film flush doors were distributed in Victoria by the Cabinet Timber Trading Co Pty Ltd.[140] By the 1940s it had become common practice to update old-fashioned panelled doors by applying a sheet of plywood to either face.[141] Newly-made doors were supplied by Gunnersen Nosworthy or Römcke Pty Ltd, both of Melbourne, in a variety of elegant timber veneer finishes,[142] and in 1955 a flush door made by Bruynzeel of Holland, with a stable core of 'patented fibrous construction', became available through the Sydney agents Borsumy Pty Ltd.[143]

Office partitioning systems, to a greater or lesser degree demountable, had been developed largely out of wartime requirements. Victorian and Interstate Airways Limited, of the Commonwealth Airport at Essendon, Victoria, made panels of up to four feet by nine [1.2 x 2.7 m], framed in a waffle-like square grid of timber and finished flush with asbestos cement sheeting, hot pressed using a phenolic resin adhesive which had been developed for aircraft plywood. The joints between partitions were timber splines.[144] Imperial Chemical Industries of Australia and New Zealand produced 'Holoplast', a laminated plastic material which had been developed for bulkheads, and used by the British Admiralty. It was made up into partitions of a standard four by eight foot [1.2 x 2.4 m] size, again joined by splines in the timber edge pieces.[145] By the 1960s plastic laminates such as Formica and Laminex were increasingly used to face hardboards in joinery work, having begun with table tops, but now extending to a much wider range of applications. A factory for Formica was established at Thornleigh, New South Wales, by the manufacturers Thomas de la Rue Pty Ltd.[146]

j. built-in furniture

In the nineteenth century built-in furniture was common only in areas like kitchens and sculleries, though a living or dining room, especially in a humble house, might have built-in cupboards on either side of the chimney breast. There were of course specialised cases, such as built-in furniture in libraries, and wardrobes also were quite commonly built in. An example of built-in kitchen furniture as specified in 1891 is as follows:

> To frame Kitchen dresser out of 1½" deal in recess of Kitchen fireplace 9ft. high, the back to be lined with ½" V jointed Kauri. Provide 2" Kauri top with three dovetailed drawers, five shelves above checked to receive crockery ware, also cup hooks. Provide pot board out of 3" x 1" battens 2" apart. Provide to the lower portion three panelled doors sliding upon Blackwood runners. Cap the above with 4" sprung moulding. Line the top with deal boarding.

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140 *Journal of the Royal Victorian Institute of Architects*, xxxiv, 4 (September 1936), p xi.
141 *Plywood, its Preparation, Properties and Uses* (Brisbane 1947), pp 37, 40.
142 *Ramsay's Catalogue* (1949), §§ 24/2, 24/3.
143 *Cross-Section*, no 30 (1 April 1955), p 1.
144 *Ramsay's Catalogue* (1949), § 25/2.
145 *Ramsay's Catalogue* (1949), § 25/1.
146 *Cross-Section*, no 53 (1 March 1957), p 3.

> To prepare and fix cupboard in opposite recess of Kitchen fitted and finished in the same manner as Dresser excepting that the top portion is to be fitted with three sliding doors working on blackwood runners and to [...] Kitchen provide with four upper and lower sliding doors the inside of cupboard to be divided with 4" x 1" v jointed kauri. Provide also smaller cupboards above same with sliding doors prepared for glass and to match the others. The inside to be fitted with one shelf.
>
> Prepare and fit up the opposite side of Pantry as follows Provide 2" Clear Pine top, the centre portion cut to receive lead sink, with groove on under edge. Divide the under portion on each side of sink to form cupboards, with two pairs of panelled sliding doors, the inside to be fitted with two tiers of shelves. The upper portion (above the 2" top which is to be 3 ft. high) To be provid[e]d with 5 tiers of 1" shelving. Frame sides to same. Provide also three nests of drawers (four to each nest). All the above to be made out of deal.[147]

The rise in building-in took place in the Edwardian period, perhaps partly in response to space considerations, for space standards declined across the board, and most pronouncedly in middle class housing. A telling story is that of the Melbourne architect, H D Annear, whose father-in-law is said to have paid for the first family home built in Eaglemont in 1903, for which reason Annear built in everything he could, so as to avoid the cost of buying furniture himself. The decline in the number of servants and a general interest in more streamlined modern living ensured the continuation of this trend until World War II, after which it if anything reversed somewhat.

The Portal Bed Company of Milwaukee, Wisconsin, was a prominent maker of disappearing wall beds early in the twentieth century, and the device soon came to Australia.[148] In 1915 the American Wall Bed Co of Sydney was advertising its 'Oscillating Portal wall Bed', over a hundred of which had already been installed in the Temperance & General Apartments in Sydney, though the company was yet to appoint agents in other Australian cities. This bed was not 'the same old thing that was in existence 20 years ago', but a full-sized iron collapsible bed that revolved 'in a 22 in. Arc'. It seems to have consisted of a bed set against a pivoting panel, such that the bed could be collapsed against the panel, and the panel itself rotated on the vertical axis to remove the bed from view - or to face it into an adjoining room or outdoor sleeping area, in accordance with the current fresh air fad.[149] Other innovations, typical of the 1920s, were built-in units between kitchen and dining room, containing a servery hatch, and cupboards and drawers which opened into both spaces; rubbish bin cupboards in the kitchen, with a door on the outer wall to remove the bin; and milk hatches operating in the reverse manner.

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147 Law, 'Specifications ... for Mrs. L. Abrahams', pp 18-19.

148 *Sweet's Catalogue* [1906], pp 708-9.

149 *Building*, 12 May 1915, p 163. By 1922 they had agents in Melbourne, Brisbane, Perth, Hobart and Dunedin: *Building*, 12 October 1922, p 40.