

9.01 Heating

- a. chimneys
- b. fireplaces
- c. the colonial oven
- d. cooking stoves
- e. ranges
- f. incinerators
- g. kerosene
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a. chimneys

There is very little in the field of services that can be regarded as specifically ethnic in origin, but it is true that Cornish round chimneys are widespread in Australia. They were brought by Cornish miners, and are found in Cornish houses in the mining areas of South Australia. They are also found in many other localities, and were used in the isolated settlement of Port Essington, on the Cobourg Peninsula, while E and D Baglin illustrate one in the Blue Mountains.¹ They likewise occur on a larger scale in Cornish operated mining works, and one of these round chimneys survives at the Duke of Cornwall Mine at Fryerstown, Victoria - a venture promoted by the Cornishman R L M Kitto.²

Another form of chimney that deserves comment, even if it is not fully explicable, is that which is an ordinary square in plan, but with brick courses progressively offset so that it is helical in form. This probably stems from the Dutch building tradition in South Africa, where Lewcock traces it to Baroque influence.³ In 1846 this type was recommended for use in Adelaide by a journalist who had seen it in Cape Town:⁴

I do not remember to have noticed it elsewhere ... the upper end of the flue (which is here finished square, and in London with chimney pots) is at the Cape, carried up in the form of a spiral or Archimidean screw, by a particular mode of laying the bricks.

The intention was perhaps not merely ornamental, but to prevent smoke blowing back into the house. Although no examples are known to survive, this may be attributable to the relative instability of the form, and until quite recent years there was one such chimney on a house at the corner of Grattan and Swanston Streets, in the Melbourne suburb of Carlton.

¹ E & D Baglin, *Australian Chimneys and Cookhouses* (Sydney 1979), pp 19, 67.

² Mark Whitmore, 'The Duke of Cornwall Mine, Fryerstown, Victoria', *Historic Environment*, II, 3 (1982), pp 5-21.

³ R B Lewcock, *Early Nineteenth Century Architecture in South Africa* (Cape Town 1965), pp 203, 245.

⁴ *Builder*, IV, 161 (7 March 1846), p 110: notes taken from the *South Australian Register* and *Adelaide Observer*.

The Preston brickmaker James Coe was producing chimney pots by 1858,⁵ and in 1859 A Cheale was advertising chimney pots, chimney linings and air flues, all of which could be made to order at short notice.⁶ Luke Nolan, of the Gillbrook Pottery, Brunswick, seems to have been the source of a large number of distinctively designed chimney pots. One bearing his brand, and decorated with heart-shaped openings around the collar, was found at a now-demolished South Yarra cottage,⁷ and many others of the same form are found in buildings of the period 1859-72.⁸ The South Australian Pottery, near Magill, was making chimney pots by 1869.⁹ The English firm of Doulton and Company, which had a Melbourne agency imported from the parent company 'terra cotta chimney tops',¹⁰ including, according to an advertisement of the time, 'Terra Cotta Chimney Tops of various and approved shapes for smokey chimneys'.¹¹ One type was the subject of a Victorian patent in the name of James Doulton, for improvements in chimneys whereby they were constructed with pyramidal tops and screens rising above them.¹² In England Doulton & Co were still making chimney partitions in the 1920s, in two styles, as well as chimney tops to go between them, though now in the form of a flat cone rather than a pyramid.

There were also metal cowls of various sorts, both imported and locally made. At the Great Exhibition of 1851 wind guards for chimney tops were shown by Isaac Green and J Beeston, and the former was illustrated. Though the section is not shown, it appears that on top of the chimney shaft there is an inverted cone, which is presumably open at the top, for on top of this is a small disc, and it seems that there is access between the cone and the disc.¹³ A little later Bailey's 'Smoke Guard' was a prominent device which was supposed to increase the drawing power of a chimney by doubling the area of the outlet, at the same time protecting it with a conical top and a circular ring or band, intended to prevent the wind from entering.¹⁴ This was a simple design, but far more complicated ones were also on the market.

A rotating cowl called 'the Circulator' was being sold in about 1815 by the patentee, W Farlar of London, as a cure for smoky chimneys. Without an illustration it is difficult to assess it, but it was described as being of iron, fixed to the top of the chimney, having a rotary action, being noiseless, and preventing rain or hail from entering the chimney.¹⁵ In 1836 a rotating chimney cowl made by one Dowson, a

⁵ Victoria Industrial Society, *Catalogue of the Eighth Annual Exhibition* (Melbourne 1858), p 10.

⁶ *Australian Builder*, 18 June 1859, p 152.

⁷ Information 1999 from Peter Latreille, former owner of the cottage in Argo Street, South Yarra. Latreille has the pot, which is in a damaged state, and plans to restore it.

⁸ 'Overnewton', Keilor, additions of 1859; 'Osborne House', 54 Osborne St, Williamstown, 1860; the first part of 'Blythvale' homestead, western Victoria, 1860s; 'Titanga' homestead, western Victoria, 1870-72.

⁹ Noris Ioannou, *Ceramics in South Australia 1836-1986: from Folk to Studio Pottery* (Netley [South Australia] 1986), p 78.

¹⁰ C B Mayes, *The Victorian Contractors' and Builders' Price-Book* (Melbourne 1859), p viii.

¹¹ *Australian Builder*, 1860-61, advertisements, passim.

¹² No 291 to James Doulton, 3 December 1859.

¹³ London, Great Exhibition of the Works of Industry of all Nations, 1851, *Official Descriptive and Illustrated Catalogue* (3 vols, London 1851), I, p 329. Others included G Cooper's 'Venetian' chimney top, designed to create an upward draft and to prevent a downdraft, and Abraham Green's 'protective syphon chimney-pot' to cure smoky chimneys: *ibid*, II, pp 617, 597

¹⁴ *Builder*, XI, 530 (2 April 1853), p 222.

¹⁵ W Farlar, 'The Circulator for the cure of Smokey Chimnies' (London, no date [c 1815]), passim.

London ironmonger, was described by a correspondent of the *Architectural Magazine*. It took the form of a short cylinder across the top of the chimney flue, with a vane on top to keep it pointing in the same direction as the wind. A conical aperture on the windward side of the tube allowed the draught to pass through at an accelerated rate, presumably creating a Pitot tube effect and drawing the air out from the flue.¹⁶ The appearance of the rotating chimney cowl in Australia cannot be accurately dated, but a sketch of 1860 shows one in position on the Manifolds' third homestead at 'Purrumbete', Victoria, built in the later 1850s.¹⁷ By 1861 the Sydney metalworker Mark Berry was advertising fifty different models of chimney cowl, an almost over-profuse variety, and in many cases over-elaborate in design - many with offset shafts, double heads, rotating cowls, wind vanes and so on.¹⁸

The South Australian engineer Oswald Brown received a patent in 1879 for an 'improved chimney-top and ventilator',¹⁹ which has yet to be investigated. In 1889 Barnett Brothers of Melbourne were agents for Cohen's Patent Deflector Flue Cap, and were so confident of its capacity to cure smoking chimneys that they offered a 'no-cure-no-pay' deal.²⁰ Another British type was the 'National', made by Wright, Sutcliffe & Son of the Globe Sanitary Works, Halifax.²¹ In 1890 there was an interesting episode at Melbourne University, where the architects Reed & Smart installed a 'Torpedo' cowl to cure a smoky chimney at Professor Allen's house. Allen's wife, Julia, wrote that the chimney now smoked in two winds rather than only one. She wanted a 'Grey' or 'Gray' cowl, which was recommended by A K Henderson as curing none out of ten chimneys, but could press for this only discreetly because of the tensions then existing between Henderson and his erstwhile partners Reed and Smart.²² This is probably a reference to the Standard Adelaide (Gray's) revolving exhaust cowl, which will be mentioned below.

b. fireplaces

Cooking stoves were abnormal before the mid-nineteenth century, and a surprising amount of cooking was achieved in an open fireplace, while in the towns it was still common to carry one's roast to a baker's oven. As late as 1867 it was said that in England 'large open grates' were generally in use, though now being superseded by cooking ranges of one sort or another.²³ Stoves caught on even more slowly in Australia than in England for, for where wood was plentiful and the climate warmer

¹⁶ *Architectural Magazine*, July 1836, pp 315-6.

¹⁷ Reproduced in Heather Ronald, *Wool Past the Winning Post* (South Yarra [Victoria] 1978), p 136.

¹⁸ Sands's *Sydney Directory* for 1861, reproduced in Ian Evans, *Restoring Old Houses* (South Melbourne 1979), p 89.

¹⁹ D A Cumming & G C Moxham, *They Built South Australia: Engineers, Technicians, Manufacturers, Contractors and their Work* (Adelaide 1986), p 31, citing South Australian patent 94, August 1879.

²⁰ *Australasian Builder & Contractor's News*, 7 September 1889, p 278.

²¹ *Building News*, 20 April 1888, p xxiii.

²² Julia M Allen to - James, 25 June 1890, 13 July 1890, University of Melbourne series 312, 1890/5 Buildings, by courtesy of George Tibbits.

²³ *Cassell's Household Guide to every Department of Practical Life* (4 vols, London, no date [c 1869-71]), I, p 5

there was less incentive to make the change. William Howitt, having looked around Melbourne and environs late in 1852, said 'One thing pleases me here - the old English dog in the fire-places of the country houses, instead of stoves.'²⁴ But by 1862 it was being argued, even in Queensland, that it was 'very poor economy' not to install a kitchen stove.²⁵

In rural dwellings cooking on the open fire remained common longer than in town, and one country dweller described the arrangements:²⁶

From an iron bar up and across the chimney, trace (plough) chains are fixed; on these hang the large or smaller boiler, the 3 gallon water tea kettle, and when needed the frying pan, saucepan, or a camp oven, a pot hook with a "sort of a swirl" held the saucepan. The cooking utensils were made of cast iron. As the settler increased in riches and knowledge, an iron crane was introduced to the fire place. This was like a one bar (top) gate and held with simple gadgets the hanging cooking vessels, and did away with long chains and heavy lifting, the kettles and pots could be brought on and off the fire with little effort, a camp oven was used for baking - (bread, meat, potatoes + some kinds of puddings) placed in the fireplace, a fire under and above. The youngsters knew how to cook potatoes and onions, in the ashes ...

The camp oven is not to be confused with the colonial oven, discussed below, for it is a utensil rather than a fitting - a cooking pot with a removable lid, a handle to either side, and typically three short legs, which allowed the embers to be pushed right in beneath it. It was not an Australian invention, for while Robert Gouger reported in 1836 that 'Cast-iron three-legged pots are much used in out-of-doors cookery in these colonies', he seems to be recommending that emigrants should bring them from Britain, and 'they should be provided with a bale and cover'.²⁷

There is one minor characteristic of fireplace design which derives from British tradition, but in Australia seems to be associated with a particular region, that of the coastal limestone area from Port Fairy in Victoria to Robe in South Australia. In early cottages in these towns the back of the square chimney flue is set in plan slightly behind the back of the fire chamber. This is in itself common enough, but usually it angles forward to the fire back somewhere near the throat of the chimney, whereas in these houses it continues well down. Thus it descends as a sort of rectangular channel in the fireplace back for a short way before the base slopes forward to meet the main vertical face. Older English examples tend to have the 'sinking' or 'smoke check' proportionally wider, and descending almost to the level of

²⁴ William Howitt, *Land, Labour, and Gold; or, Two Years in Victoria, &c* (2 vols, London 1855), I, p 57.

²⁵ Ian Evans et al, *The Queensland House: History and Conservation* (Mullumbimby [New South Wales] 2001), p 25, quoting William Coote, in *Transactions of the Philosophical Society of Queensland*, I, 1859-82, unpaginated [John Oxley Library].

²⁶ J K Andrews, 'History of Merrigum' (manuscript, Merrigum [Victoria] 1954, copy provided by Anne Tyson, 1997), pp 61-2.

²⁷ Robert Gouger, *South Australia in 1837; in a Series of Letters: with a Postscript as to 1838* (London 1838), quoted in Penelope Hope [ed], *The Voyage of the Africaine* (South Yarra [Victoria] 1968), p 26. Gouger goes on to write of the 'camp-oven' in the same paragraph, but it appears that he does not intend this term to apply to the three-legged pot.

the hearth. Percy Thomas wrote of it as one of the 'small refinements met with in old works [which] should be carefully observed in modern practice'.²⁸ This advice does not seem to have been heeded in Britain, much less in Australia, in or after his time.

Other forms of fireplace were transmitted by literary sources and by the middle classes. Benjamin Thompson (Count Rumford)'s *Chimney Fireplaces with Proposals for Improving Them* of 1795 was known in Australia in the early years of settlement,²⁹ and families as sophisticated as the McCraes in Victoria, were almost obsessively concerned that their fireplaces should be built on the Rumford plan.³⁰ The 'Rumford Stove' was an improved design of fireplace in which the area of the fire chamber was contracted, the sides sloped back at 45° in plan, and the depth was equal to the width at the back. The throat of the chimney was reduced to a narrow slit (formed on one side by a flagstone which could be removed for the purpose of sweeping the chimney) and the breastwork leading in to it was rounded off so as to avoid any obstruction to the smoke.³¹

Somewhat analogous with this was the so-called 'Russel Stove' - not really a stove as we would understand it, but a sort of sheet metal fireplace and grate. It was the invention of John Russel, lecturer in natural philosophy [physics] at Edinburgh, and consisted of a vertical back with an attached grate, surrounded by iron plates coming forward at 45° not only to the sides, like the Rumford fireplace, but above and below as well. The grate was simply a basket attached to the back surface, surmounted by a small canopy to help gather the smoke into a flue behind. It was made by J Sibbald & Sons of Edinburgh,³² and though it may not have reached Australia it is necessary to refer to it, if only because of the confusing references to the 'Russell' cooking stove in the colonies. Less radical was the hob grate, in which the grate proper was placed between cast iron boxes, as in a surviving example at 'Lindesay', Sydney, of 1834-6.³³ These are far rarer in Australia than in Britain, but a very handsome Aesthetic Movement version is found in the master bedroom of the 'Villa Alba', Melbourne, and another elegant one, probably of local manufacture, can be seen at 'Dundrennan', 2 Walker St, St Arnaud, Victoria, of 1884, branded:

ST ARNAUD FOUNDRY
ANA GRATE

²⁸ Percy Thomas [ed], *Modern Building Practice* (4 vols, London, no date [c 1935]), II, pp 435-6; III, pp 375-6..

²⁹ Robert Irving, 'Georgian Australia' in Robert Irving [ed], *The History and Design of the Australian House* (Melbourne 1985), p 55, ref James Broadbent 'Early Sydney Houses ...' (where it is not found), and Joan Kerr & James Broadbent, *Gothick Taste in the Colony of New South Wales* (1980), p 35.

³⁰ W G McCrae to Georgiana McCrae, March 1845 in G G McCrae [ed], *Letters to Georgiana from her Four Sons* (Arthur's Seat [Victoria] 1986), no page; also Hugh McCrae [ed], *Georgiana's Journal* (Sydney 1934), pp 142, 151, 161.

³¹ Charles Tomlinson, *A Rudimentary Treatise on Warming and Ventilation* (London 1850), pp 79-80. See also Lawrence Wright, *Home Fires Burning* (London 1964), pp 115-117; John Gwilt [ed Wyatt Papworth], *Encyclopædia of Architecture* (London 1888), p 747, for subsequent developments.

³² J C Loudon [ed], *Architectural Magazine*, I, pp 34-6.

³³ Illustrated in Joan Kerr, "'So Elegant an Edifice": the Building of Lindesay', in Dinah Dysart & Joan Kerr [eds], *Lindesay: a Biography of the House* (Sydney 1984), p 22.

A number of English patents and other improvements to fireplaces and flues, mostly of the 1840s and 1850s, are discussed in Richardson's *The Englishman's House*,³⁴ a work which was used in Australia, though their local impact is yet to be demonstrated. However one house of 1867 adopted something approaching the principles of Benjamin Franklin³⁵ and, so as to avoid draughts caused by the suction of the fire, provided for fresh air to be admitted through a grating in the hearth which could be regulated.³⁶

Much more widespread is an improved form of grate, the bivalve, in which the usual lunette-shaped opening into the flue has its own lid, but the annular surround to it can also be opened. There do not seem to have been any examples shown at the Great Exhibition of 1851 or the Dublin Exhibition of 1853, but an early version, not called a bivalve but the 'patent Vesta register grate', was sold by the London ironmongers Clark & Hunt in the early 1860s. They argued that by keeping the inner trap closed and the annular trap open, once the fire had 'burnt up', the excessive rush of air to the chimney was checked, and with it the tendency of the fire to 'burn black' on top. The remaining opening was still sufficient for the escape of the hot gases. In Clark & Hunt's model the surrounding arch reveal was concave rather than flat, so that the hollow part directly above the fire would project the radiation more or less horizontally across the room, on the principle of a parabolic reflector.³⁷ Rather oddly, however, William Eassie, as late as 1879, writes as if the bivalve is a new development, and still a monopoly: 'Besides the univalve register grates, there are ... now the bivalve registers, sold by Messrs. Lowman, Taylor & Co., of London.'³⁸ It is also puzzling that such an apparently ubiquitous device as the bivalve grate is not mentioned in the later editions of Gwilt's *Encyclopædia of Architecture*, where other improved and patent types up to the 1880s are discussed.³⁹

Dates have not been established for the bivalve in Australia, and this is not easy to do because grates were commonly replaced in the nineteenth century, and are still more commonly replaced by house renovators today, so the date of the building is not a reliable guide. One appears, without any specific reference to it, in an advertisement

³⁴ C J Richardson, *The Englishman's House from a Cottage to a Mansion* (London 1870), pp 406-414.

³⁵ Benjamin Franklin's 'American' or 'Pennsylvanian' stove is not discussed here, because there is no evidence that it had any significant influence in Australia. However, a connection by way of London would not be out of the question. James Sharp patented certain improvements in the stove, and published his *An Account of the Principle and Effects of the Air-Stove Grates ... commonly known by the name of American Stoves; together with some Late Improvements made to them by James Sharp, for which His Majesty's Patent has been Obtained* (London, after 1781): Charles Wood, *Catalogue 108* (Cambridge [Massachusetts] 2001), pp 36-7, no 126. John Murray and Adam Anderson's patent for 'a stove or furnace to produce ventilation as well as warmth' seems also to relate to Franklin's principle: Great Britain no 3287, 14 December 1809.

³⁶ This was 'Rajpootana', St Kilda: *Argus*, 15 March 1867, p 6.

³⁷ F W Laxton, *Laxton's Builder's Price Book for 1863* (London 1863), advertisements, unpaginated.

³⁸ William Eassie, *Healthy Houses* (New York [London] 1879), p 182.

³⁹ Gwilt, *Encyclopædia of Architecture* (London 1888), pp 747-8, §2279d.

of 1875,⁴⁰ and it seems that they were still being sold as 'Wright's Patent Bi-valve' well into the 1880s, suggesting (as a normal patent ran for fourteen years) that this version was introduced no later than the early seventies. The catalogue of the Melbourne ironmonger James McEwan, apparently of about 1880, illustrates two models of patent bivalve grate, which look like Wright's but are not identified.⁴¹ One house in Fitzroy, Victoria, has a 'Wright's Patent Bi-valve', but in other rooms an 'Improved Bivalve' and an 'Improved Registered Duplex'.⁴² At 'Ferndale Manor', Castlemaine, of 1859-60, there are three bivalve grates, one of them branded:⁴³

[upward arc
IMPROV'D PATENT
]
[valve lunette]
BIVALVE

A more enigmatic device is the 'plate-glass blower which effectually prevents smoking, that bane of houses in mountainous regions'.⁴⁴ This was fitted at Sir George Verdon's house 'Alton', Mount Macedon, late in the century. Apart from the various bivalves, various branded or patented examples are found, such as a Crosthwaite's Patent No 2495, in a house of 1888-9, as yet uninvestigated.⁴⁵ Most of these grates must be assumed to be of British manufacture, or at least based upon British designs, but no research is available on the subject. Incandescent iron, asbestos fibre, and patent ball fires, the predecessors of the fake coal fires of the twentieth century, were available in Britain in the 1890s in a range of models,⁴⁶ but do not seem to be reported in Australia until much later.

Only in the twentieth century is there a specifically local innovation, in the form of the 'Australian Open Fireplace' of the architect H D Annear. It was designed to draw well and to clean easily, and the base, which joined flush with the hearth rather stepping up from it, sloped backwards to obviate the tendency for collapsing fuel to roll out at the front. Fireplaces to this design are found in a number of Annear's own buildings, but he also published it in the *Real Property Annual* in 1921⁴⁷ and in *Every Man's Home* in 1922,⁴⁸ and it may be found anywhere. Another architect in Victoria who made use of it was Marcus Martin, for example in his renovations at 'Mooramong' homestead, and in 1947 the New South Wales architect Kenneth

⁴⁰ Advertisement by Whitney Chambers & Co of Melbourne, in Melbourne, Victorian Intercolonial Exhibition, *Official Catalogue* (Melbourne 1875), advertiser p 19.

⁴¹ *James M'Ewan & Co.'s Illustrated Catalogue of Furnishing and General Ironmongery* (Melbourne, no date [?c 1880]), p 66.

⁴² 140 George St, Fitzroy, undated, inspected 1997.

⁴³ Inspected 2004.

⁴⁴ 'Wanderer', 'Picturesque Macedon', *Gisborne Gazette*, 5 February 1895, reproduced in Nigel Lewis & Associates, 'Alton and Hascombe, Alton Road, Mount Macedon' (mimeographed report, South Yarra [Victoria]), p 93.

⁴⁵ Reported as 'Crossthaite's', almost certainly erroneously: 'Yooralbyn', Erin Street, Richmond, reported by Tanya Hancock, Australian Architecture B, University of Melbourne, 1997.

⁴⁶ T & W Farmiloe, *T. & W. Farmiloe's Miniature Catalogue* (London 1894), pp 631-8.

⁴⁷ H D Annear, 'Built in Furniture: Savings in Cost and Labour', *Real Property Annual* (Melbourne 1921), pp 31-3, cited in Harriet Edquist, *Harold Desbrowe-Annear: a Life in Architecture* (Melbourne 2004), p 224.

⁴⁸ *Every Man's Home*, 1 March 1922, p 48.

McConnel illustrated a very similar form in his book *Planning the Australian Homestead*.⁴⁹

By 1933 the locally made 'Domus' fire was being sold by Edward Jenkins Pty Ltd of Melbourne, but whether it was an Australian invention or development is not clear. It was simple enough, consisting of a metal grate, with an ash pan beneath which could be pulled out, and a fireclay back which leaned forward well over the grate. This back plate incorporated vertical grooves or channels, which were claimed to have a beneficial effect.⁵⁰ At about this time McEwans offered a slow combustion fire grate with fire grating, ash pan, front fret and 'lift up' top roll.⁵¹ In the 1940s the 'Wonder-Heat Air-Conditioning Fire' was on sale. This was a fire which burnt conventional fuels, such as wood, coal and coke, but was set behind a glass screen and was designed to circulate hot air effectively throughout the room, without sooty smells or draughts.⁵² In 1954 A E Goodwin of Sydney introduced the Firemaster grate 'based upon a new American principle', which could be fitted into an ordinary fireplace. It was said to prevent smoking and to produce three times as much heat.⁵³

c. the colonial oven

A significant development was the 'colonial oven'. This was a box made generally of sheet wrought iron, rather than cast, and was therefore relatively light; it was designed to be used with timber fires; and it could be built into existing fireplaces. A fire was placed below it, and it had provision for an additional fire on top with bars on which pots could be placed, so that it was sometimes referred to as a 'two-fire' stove. Richard Twopeny described it as 'a sort of box with fire above and below, which is very convenient for burning wood, the usual fuel throughout Australia'.⁵⁴ Sometimes five gallon drums with tight fitting lids, laid horizontally, were used for the purpose.⁵⁵

The origin of the colonial oven is particularly difficult to trace because one cannot assume that the name - meaning simply an oven made in the colony - necessarily refers to the form that ultimately evolved.⁵⁶ In 1836 Robert Gouger had recommended as 'a most useful thing' for emigrants to South Australia, 'An iron

⁴⁹ Kenneth McConnel, *Planning the Australian Homestead* (Sydney 1947), p 50.

⁵⁰ D W Tulloch, *Details of Australian Building Construction* (Melbourne, no date [c 1933], p 90.

⁵¹ W L Richardson, *Ramsay's Architectural and Engineering Specifications [Volume 1]* (Melbourne, no date [1934]), p 49.

⁵² *Australian Home Beautiful*, January 1941, p 42.

⁵³ *Cross-Section*, no 20 (1 June 1954), p 3..

⁵⁴ Richard Twopeny, *Town Life in Australia* (1976 ed), p 44, quoted in Phyllis Murphy, 'The Colonial Kitchen' in Robert Irving [ed], *The History and Design of the Australian House* (Melbourne 1985), p 237.

⁵⁵ J K Andrews, 'History of Merrigum' (manuscript, Merrigum [Victoria] 1954, copy provided by Anne Tyson, 1997), p 62.

⁵⁶ See Phyllis Murphy, 'The Colonial Kitchen' in Robert Irving [ed], *The History and Design of the Australian House* (Melbourne 1985), p 236, for a description of the colonial oven. However, Murphy describes it as being made of steel, which would be a much later development, and does not discriminate between the name and the object.

portable oven [or] double wrought iron oven',⁵⁷ which sounds like its antecedent. Certainly something approaching the canonical colonial oven, in that it was shaped like a chest and made mainly of wrought iron, was invented in about 1849 by one Roberts, former engineer of the Yatala Smelting Works, South Australia. It retailed at between £6.6s and £18.18s according to size, and:

The processes of baking, roasting, and boiling are accomplished to admiration; and these are not all, for, while the laundress is heating her fish-iron on the hot-plate, she may be roasting some potatoes for her supper in the ash-pan below. There are also oven-tables for pantry. In form, the apparatus is as compact as a chest - not as a lawyer's deed chest - for the appearance is decidedly culinary - but so that it may be adapted to any hearth where there is room to receive it, even without the aid of a bricklayer. ... The fuel may be coal, charcoal, or wood cut into short lengths. ... The apparatus is entirely composed of wrought iron, with the exception of the hot plate and the grate.⁵⁸

In 1850 the Sydney ironmonger Arthur Gravely began making a model which consisted of a hotplate and oven, which sounds like the colonial oven, though he called it 'Gravely's Californian Stove' to promote its acceptance in that then lucrative market.⁵⁹ Colonial ovens were one of the things allegedly made by F Wallis from the 1850s, and at the 1866-7 Intercolonial Exhibition Wallis (then of the Melbourne suburb of Collingwood) showed various 'colonial ovens' and was described as the 'Inventor & Exhibitor of the Patented Colonial Oven'.⁶⁰ However the first clearly documented colonial oven (and perhaps the first appearance of the name) appears to be that patented in 1865 by William Hutchison of Melbourne, though his patent claimed only the method of assembling the iron plates by means of grooves, and the overall design was apparently standard. It was a box with a door in its face, but the sides and back were double, with a considerable cavity between. Two holes in its base, at either end, admitted to the smoke and hot gases, which then circulated about in the cavity before reaching a hole at the top of the back, and being let out again into the chimney.⁶¹

This shows us that the colonial oven differed in shape, but not in principle, from the portable iron cottage ovens on sale in England during the 1830s. One illustrated by Loudon had a flat bottom and an arched top, with a cavity running around the whole. A large opening in the base gave access to the fire, and an opening at the top let the combustion products out.⁶² The main difference from the colonial oven is that the

⁵⁷ Robert Gouger, *South Australia in 1837; in a Series of Letters: with a Postscript as to 1838* (London 1838), quoted in Penelope Hope, *The Voyage of the Africaine* (South Yarra [Victoria] 1968), p 26.

⁵⁸ *South Australian Register*, quoted *Argus*, 12 January 1850, p 2. The inventor can probably be identified with an engineer of the same name, who assisted in the construction of the Independent Chapel at Kensington, South Australia, in 1844: E & R Jensen, *Colonial Architecture in South Australia* (Adelaide 1980), p 76.

⁵⁹ *Sydney Morning Herald*, 8 February 1850, p 4.

⁶⁰ Melbourne, Intercolonial Exhibition of Australasia, *Official Record* (Melbourne 1867), p 24.

⁶¹ Victorian Patent no 752 to William Hutchison, 24 September 1865.

⁶² J C Loudon, *An Encyclopaedia of Cottage, Farm and Villa Architecture* (London 1846 [1833]) [§ 596], p 286.

cavity was continued right across the top, but possibly - for this is unclear - did not continue across the back. Another oven made by William Jeakes of London, similarly had double sides and bottom, so that it was not overheated by direct contact with any particular part of the fire, but warmed by the gases circulating in the cavity.⁶³

William Hutchison showed his patent colonial cast iron ovens at the exhibition of 1866-7, but was now only one of a number of Melbourne makers, as follows:

Hughes & Harvey

- 2 ft 6 in x 2 ft x 1 ft 6 in: wrought iron strengthened with angle iron, wrought iron trivets, the front grate folding down to support the ends of long wood when used as fuel, £4.
- 2 ft x 1 ft 6 in x 1 ft: with bright mountings, 50s.
- 2 ft x 1 ft 6 in x 1 ft: with black mountings, 20s.

William Hutchison

- 2 ft 6 in x 1 ft 6 in x 1 ft 3 in: patented, cast iron, double cased, with two trivets and link kettle-holder, £3.
- 24 in portable colonial oven, 34s, with hobs 12 s extra.

F Wallis

- 3 ft x 1 ft 6 in x 1 ft 2 in: £3.
- 2 ft 6 in x 1 ft 6 in x 1 ft 3 in: £2. 10 s.

McCallum Brothers (Harnwell, maker)

- 3 ft x 1 ft 6 in x 1 ft 3 in [No 6]: 1/4 in plate on top, 3/16 in bottom, best bright, with two shelves, scroll spring, brass ventilator, two bars on top, 52 s
- Same size, but black, 48 s.
- Other sizes in proportion down to no 6, 1 ft 6 in x 1 ft 4 in x 10 in, bright 15 s 6 d, and black 14 s.⁶⁴

In 1874 Emily Patton of Melbourne patented an improvement in which an iron plate with apertures in it to hold cooking vessels rested on the hob, above the top of the oven, which not only was convenient but also enclosed the oven and it made it more

⁶³ Loudon, *Encyclopaedia of Cottage, Farm and Villa Architecture*, [§1504], pp 717-9. In his patent of 1838 Jeakes used a similar principle for a room heating stove, to warm incoming air and remove stale air. There was a casing around the stove 'into which pure atmospheric air is admitted by a pipe at the bottom ... heated by contact with the stove, and escapes through the top.' A second casing at the back would receive cold air or 'air rendered heavy by respiration', and discharge it into a tube surrounding the smoke flue. Great Britain, patent no 783 to William Jeakes, 22 October 1838.

⁶⁴ Intercolonial Exhibition, *Official Record*, p 23.

economical.⁶⁵ In 1880 a Sydney engineer called Hughes patented an improvement in which the fire was placed above rather than below the chamber. On top of this again could be placed, when required, 'a perforated plate upon which ordinary cooking could be done', all much on the Patton principle.⁶⁶ Meanwhile in 1875 Hutchison's ovens were 'patent' but not 'colonial'; Wallis was still making colonial ovens, as was A R Walker of La Trobe Street, while Michael Raleigh of Carlton made a patented colonial oven.⁶⁷ In 1879 a McLean's colonial oven costing £2.2.0 was specified for the caretaker's room in a Melbourne office block.⁶⁸ By 1911 Lassetters of Sydney were advertising the canonical colonial oven in six sizes, from 21 x 12 x 16 inches (533 x 305 x 406 mm) to 36 x 18 x 18 inches (914 x 457 x 457 mm).⁶⁹ Even later, perhaps in the 1930s, D & W Chandler sold colonial ovens in sizes:⁷⁰

18 x 15 x 10

24 x 16 x 10

24 x 16 x 12

as well as the extra strong version in:

24 x 16 x 12

24 x 18 x 12

30 x 18 x 15

36 x 18 x 12.

d. cooking stoves

Cooking stoves are distinct from heating stoves, which are discussed elsewhere (though it was certainly not unknown for cooking to be attempted on a heating stove}. It is also a convenient though partly artificial distinction, to consider cooking stoves separately from ranges, the former being more varied and less substantial. For example, a 'Dutch oven complete' was offered for sale in Hobart in 1817, together with 'dripping pan', ladle & stand, tin pudding dishes, brass patent jack, toasting forks and other apparatus.⁷¹ This was a type becoming popular in England, and Loudon wrote in 1833 that Cottam and Hallen of London were about to manufacture something quite novel - a Bruges stove, as commonly used in Belgium and the Netherlands, which was a freestanding cylinder on four legs.⁷² Edward Cottam soon afterwards reported it to have proved very successful,⁷³ but it is not subsequently heard of in Australia.

Emigrants' stoves were generally designed to be lightweight, and made of sheet metal. This was probably the character of the emigrant's stove shown at the Great Exhibition

⁶⁵ Victorian patent no 1981 to Emily Sophia Patton of Melbourne, 30 October 1874.

⁶⁶ *Australian Engineering and Building News*, 1 September 1880, p 52.

⁶⁷ F M White, 'General Conditions of Contract and Specification ... Certain Offices in Queen Street Melbourne ... F. W. Prell Esqre' (Melbourne 1875), p 8.

⁶⁸ Victorian Intercolonial Exhibition 1875, *Official Catalogue* (Melbourne 1875), pp 146-7.

⁶⁹ *Lassetters' Commercial Review*, no 26, 1911, reproduced in *Australia in the Good Old Days* (Sydney 1976), p 173.

⁷⁰ D & W Chandler Ltd, [catalogue] (Melbourne, no date [c1930]), p 83.

⁷¹ *Hobart Town Gazette*, II 66 (30 August 1817), p 2.

⁷² Loudon, *Encyclopaedia of Cottage, Farm and Villa Architecture*, [§594], p 281.

⁷³ Loudon, *Architectural Magazine*, I [1834], p 77.

of 1851 by H P Andrewes⁷⁴ and the emigrant's or cottage stove shown by Huxhams & Brown of Exeter, which included a hotplate and oven, and was suitable for either wood or coal.⁷⁵ Such stoves must have been very common up to the 1850s, but they would not have been durable, and no surviving example has been reported. In 1853 an imported English house was advertised complete with a 'cottager's stove to fit'.⁷⁶ In 1839 Nathaniel Ogle recommended Arnott's cooking stoves to potential settlers in Western Australia.⁷⁷

Most stoves and ranges were imported from Britain, but by 1850 the Sydney founder P N Russell was making 'Russell's Patent Economic Roasting and Charcoal Stoves.' It has been necessary to distinguish John Russel's 'Russel stove', above, which was simply a heating apparatus, but P N Russell's stoves were probably also of British derivation, with the critical components imported. This is indicated by his announcement 'that he has received by late arrivals, a large assortment of the materials requisite' for their manufacture.⁷⁸ Russell's rival in Sydney, Richard Dawson, was by 1851 similarly making 'Patent Stoves, for either wood, coal or charcoal.'⁷⁹ By 1861 William Jenkinson of Melbourne was manufacturing a 'portable oven' of his own invention, and the ironmonger Walter Powell exhibited a 'thermometer oven' of unspecified origin,⁸⁰ presumably inspired by Dr Arnott's 'thermometer stove', discussed below.

In 1853 it was reported that cooking stoves were being widely introduced in Victoria, though too expensive for general use.⁸¹ American stoves - like the 'Golden Age', 'Vulcan', 'Crescent', 'Leviathan', 'Empire City', 'American Union', 'Our Favourite' and 'Union' were far more popular than British ones, in part, it would seem, because they were designed to burn timber rather than coal.⁸² E C Wheelock of Melbourne made a speciality of importing them, typically from New York and Boston.⁸³ By 1854 there was also an American Cooking Stove Depot in George Street, Sydney, offering 'Californian cooking stoves' for sale.⁸⁴ It is doubtful whether they were in fact made there, as it is believed that large scale manufacture of stoves began in California only in the 1870s,⁸⁵ so they may have been re-exports originating in the eastern states. One shipment of two hundred, then another of four hundred cooking stoves arrived

⁷⁴ Great Exhibition 1851, *Catalogue*, II, p 640.

⁷⁵ Great Exhibition 1851, *Catalogue*, II, p 643: see also I, advertisements p 70.

⁷⁶ *Melbourne Auction Mart*, 4 May 1853, p 1.

⁷⁷ Nathaniel Ogle, *The Colony of Western Australia* (London 1839), p 280.

⁷⁸ *Sydney Morning Herald*, 14 January 1850, p 1.

⁷⁹ Advertisement in Ford's *1851 Sydney Directory*, reproduced in Brian Turner, *Australia's Iron Lace* (Sydney 1985), p 45

⁸⁰ Intercolonial Exhibition, *Official Record*, pp 215, 206.

⁸¹ John Sherer [ed], *The Gold-Finder in Australia* (London 1853), p 340.

⁸² *Australian Builder*, no 9 (30 April 1856), p 76; no 11 (4 May 1856), p 85; Victoria Industrial Society, *Catalogue of the Eighth Annual Exhibition* (Melbourne 1858), pp 29-30.

⁸³ *Australian Builder*, no 9 (30 April 1856), p 76, quoted in P A Barrett, 'Building through the Golden Gate: Architectural Influences from Trans-Pacific Trade and Migration between Australia and California 1849-1914' (MPD, University of Melbourne, 2001), 59.

⁸⁴ Information from Peter Barrett, 2001, citing *Sydney Morning Herald*, 11 September 1854.

⁸⁵ Barrett, 'Building through the Golden Gate', p 59.

from San Francisco, and J W Fisher sold them in large numbers. Another company sold firewood cut into lengths suitable for American stoves.⁸⁶

When W A Brodribb moved in 1855 to his Wanganella run, to the north of the present Deniliquin, New South Wales, he built a bark kitchen and equipped it with an American stove for cooking,⁸⁷ and in Victoria Alfred Joyce wrote that 'the kitchen labour is abridged as much as it can well be' by the use of an American stove.⁸⁸ Burlingame & Co of Melbourne fitted up the larger of the American stoves sold by them with 'a late colonial patent, rendering the operation perfect with bituminous or any kind of fuel'.⁸⁹ This was a patent which had been granted to Alexis Burlingame in 1857 for 'cleansing and removing soot from the flues of cooking stoves' by means of a 'flue-slide'.⁹⁰ By the 1880s, ironically, the British firm of Dobbie, Forbes & Co was advertising both American and 'Anglo-American' stoves on the Australian market.⁹¹ A 'Wood Acorn' brand stove at the Kyneton Museum, Victoria, is probably much later in date but is still of the standard type, except that it is rather square in plan proportion, with the shelf in front becoming a broad apron.⁹² A stove at 'Mugga Mugga' cottage, ACT, is raised on four legs and appears to be of the American type, but looks late in date and bears the somewhat un-American brand 'Dover No 27'.

An interesting suite of cooking apparatus was sketched by Thomas Watts in his drawings for a pair of houses built for the Reverend Joseph Docker at Elwood, near Melbourne, in 1854. It is labelled as 'Patent range including roasting apparatus wrought iron Steam Boiler - 2 Steam Kettles + 2 Steam Pans Hot Closet', and we will consider the range below. As illustrated there are two other distinct items. The steam closet is a bench height unit with a pair of doors in the front, of no great interest. The more remarkable item is captioned 'roasting apparatus self-acting', and is an upright cylinder with a domed top, containing a central axle with a cross arm at the top from which pieces of meat are suspended. The axle and cross arm, rotate - as it seems - by the power of a falling weight, which is presumably wound to the top at the outset. At the base of the cylinder are what look like three gas ring burners.⁹³ The idea of a separate roasting oven had been promoted by Count Rumford, but never became popular in Britain,⁹⁴ much less Australia, so its appearance here is out of the ordinary.

By 1866 there were various locally made ovens other than the conventional ranges which are discussed below. For example, Earnshaw of Sandridge manufactured a three foot [0.9 m] 'squatter's oven, ribbed top and bottom, with polished brass

⁸⁶ Information from Peter Barrett, 2001, citing *Sydney Morning Herald*, 25 August 1854, no page; 11 September 1854, p 6; 26 September 1854, p 6.

⁸⁷ Peter Freeman, *The Homestead: a Riverina Anthology* (Melbourne 1982), p 262, quoting W A Brodribb, *Recollections*, pp 88-9.

⁸⁸ Alfred Joyce to his parents, 27 December 1855, in Alfred Joyce (ed G F James), *A Homestead History* (2nd ed, Melbourne 1949 [1942]), p 191.

⁸⁹ Victoria Industrial Society, *op cit*, endpaper.

⁹⁰ Victorian patent no 98 to Andrew Alexis Burlingame [*sic*], 20 October 1857.

⁹¹ *Australasian Ironmonger*, I, 7 (1 October 1886), advertisements, unpaginated.

⁹² The museum catalogue shows this to have come from the Puddle Duck Inn, near Romsey, and says it resembles a stove illustrated in the Anthony Hordern catalogue of ?1901, p 62.

⁹³ Drawings for two houses at Elwood for the Reverend Joseph Docker, Docker papers, Manuscripts Collection, State Library of Victoria.

⁹⁴ Ravetz, 'The Victorian Coal Kitchen', pp 439/442.

mountings.⁹⁵ E Alexander Rippingille was something of an intercolonial success story. He emigrated from Plymouth to Adelaide in 1850, but soon afterwards moved to Melbourne, where he set up as a platemaker and subsequently fabricated what he claimed was the first quartz crushing machine in Victoria, for the Mount Blackwood Mine. He had works in La Trobe street where he manufactured guttering and other products, until 1861, when he returned to England a wealthy man. He there established himself as a stove manufacturer with great success, and died in 1894.⁹⁶ One of his stoves is preserved at 'Mount Rothwell' homestead, Victoria, branded:

[two upward arcs:
PRIZE MEDAL
RIPPINGILLE'S
]
REGISTERED TRADE MARK
NO 78
PATENT
A.B.C. STOVE

Rippingille's patent kerosene stove was advertised in *Dr Holbrook's American Cookery*, published in Melbourne in 1888.⁹⁷

References to locally made stoves are not as numerous as those to imported types, though they must have been common enough.⁹⁸ A mystery surrounds the role of the ironmonger James McEwan. McEwan's stocked some quite elaborate stoves and ranges, which are occasionally still found, but it seems probable that the brand was simply applied to units brought in from other sources. One of his grandest seems little different from Flavel's Patent Kitchener of three decades earlier⁹⁹ (see below). Others seem to be at best direct copies (even down to the drawings in the advertisements) of those advertised by Whitney, Chambers & Co a decade earlier.¹⁰⁰ The inference seems to be either that McEwan's had acquired their business or, more probably, that Whitney Chambers were still the makers and suppliers.

In Sydney James Ward made the 'Allington' cooking stove, which won the cooking contest at the Sydney Exhibition of 1879 and which, he advertised, was used in nearly all the principal Sydney clubs and hotels.¹⁰¹ At the Centennial Exhibition of 1888-9 Metters Brothers of Melbourne, who were soon to become major manufacturers, showed 'improved ovens',¹⁰² By the turn of the century Frederick Metters of Adelaide had emerged as a leader in the field. He took out various South Australian

⁹⁵ Intercolonial Exhibition, *Official Record*, p 328.

⁹⁶ E & R Jensen, *Colonial Architecture in South Australia* (Netley [South Australia] 1980), p 91, quoting an obituary in the *Australian Ironmonger*, 1 June 1894.

⁹⁷ M L Holbrook, *Dr Holbrook's American Cookery ... with an Australian Appendix* (Melbourne 1888), advertisement, reproduced in Lane & Serle, *Australians at Home*, p 210.

⁹⁸ Terence Lane & Jessie Serle, *Australians at Home* (Melbourne 1990), p 34.

⁹⁹ *James M'Ewan & Co.'s Illustrated Catalogue*, pp 47-63. A version of the Flavel kitchener was McEwan's number 12 model, p 61, which is almost the same as the McEwan's branded range at the Villa Alba, Kew (Melbourne), of about 1883.

¹⁰⁰ Whitney, Chambers & Co advertise their 'Paragon' kitchener in *Bailliere's Official Post Office Directory of Victoria*, 1871-2. *M'Ewan & Co.'s Illustrated Catalogue*, pp 59-60 illustrates two reduced versions of the same kitchener.

¹⁰¹ Charles Mayes, *The Australian Builders' Price-Book* (5th ed, Melbourne 1886), p xxxvii.

¹⁰² Centennial International Exhibition, *Official Record*, p 556 p 614.

patents from 1898 onwards, and in 1900 advertised as a 'maker of kitchen ranges and improved ovens'.¹⁰³ Frederick Metters moved from Melbourne to Adelaide in 1890, and is credited with founding his stove making business there in 1891, though this does not explain the relationship between the Melbourne business nor which brother was his partner there. In 1894 he opened a branch in Perth where he employed Henry Spring and took him into partnership in 1898, selling out to him entirely in 1907.¹⁰⁴

Other and later stoves are not well documented. An old-fashioned but probably late example, branded 'C Andrews Patent Stove' and 'Nonpareil' survives at Exford homestead, Victoria.¹⁰⁵ In the twentieth century the 'I.X.L. Patent Cooking Stove' became the most prominent. The maker's name appears as 'Backwell's' and it was probably imported from Britain - at any rate it was said to be made solely of 'extra heavy British Steel and Iron' and based upon fifty years experience.¹⁰⁶ By contrast, the 'Eclipse' was made by Bates & Co of Fitzroy, Melbourne.¹⁰⁷ Meanwhile Metters Ltd was formed in Adelaide in 1907 with Henry Spring as managing director, and his younger brother, Robert Alexander Spring, opened a Metters foundry in Sydney in 1902. The firm continued to expand, and in 1937 introduced the famous 'Early Kooka' stove with a kookaburra and worm on the front.¹⁰⁸ By now there was little reason to import stoves or ranges, but one American range survives, supposedly salvaged from the American consulate in Melbourne when it was demolished in the 1930s. It is now at 'Ballam Park', Frankston, and is branded:

[upward arc:
G.W. WALKER & Co.
|
BOSTON
8

In the later part of the century stoves gave way to complete ranges in all larger kitchens, but in the early twentieth century the stove returned to prominence, and D F & W Chandler sold the 'Kangaroo' brand in various patterns, the Patria, Planet, Doric, Elevated Dover, Lux, IXL, Caledower and Triumph brands.¹⁰⁹

e. ranges

Roasting had traditionally been done in front of a fire on a range, which was an apparatus from which the meat was suspended. When coal was used the range developed into a deep box-shaped grate built in beneath a wide chimney. Then, during the 1780s, the range began to be combined with the oven (which had previously been a separate item) on one side and a water boiler on the other. The

¹⁰³ Cumming & Moxham, *They Built South Australia*, p 134.

¹⁰⁴ Joyce Gibberd, 'Frederick Metters (1858-1937) and Henry Langdon Spring (1864-1937)', in Christopher Cunneen [ed], *Australian Dictionary of Biography Supplement 1580-1980* (Melbourne 2005), p 277.

¹⁰⁵ Information from Peter Barrett, 2002.

¹⁰⁶ *Australian Home Beautiful*, 12 January 1926, p 6.

¹⁰⁷ *Australian Home Beautiful*, 12 January 1926, p 73.

¹⁰⁸ Gibberd, 'Frederick Metters & H L Spring', p 277.

¹⁰⁹ D & W Chandler Ltd ,[catalogue] (Melbourne, no date [?c1930]), pp 81-5. The catalogue gives the name as 'Caldower' but the correct spelling can be seen on the stove as illustrated.

boiler was typically L-shaped in plan so as to maximise the surface exposed to the heat. This apparatus, in which three distinct cooking functions were combined, was the 'combination range' which predominated in the nineteenth century.¹¹⁰

Cottage ranges in the early nineteenth century were modest compared with the giant objects now familiar to us. One made by Eckstein of London, illustrated by Loudon, was like an ordinary fire grate placed between two iron boxes, one of which was of course the boiler and the other the oven.¹¹¹ Which forms of stove or range may have been used in early Australia is simply unknown. A range was installed at Government House Parramatta, probably in 1812, but Lane and Serle conclude that it must have been at least partly open, as the kitchen contained a dripping pan, stand and fender such as were used for roasting in front of an open fire.¹¹² It may well have resembled Farlar's range, discussed below. Ellis Bent's kitchen had a range including an oven door and 'stew holes' (supplied by the local blacksmith Thomas Storer) as well as a jack roasting apparatus, which his widow tried to sell to the government in 1816.¹¹³ In 1835 the Hobart ironfounder Robert Russell advertised his preparedness to make 'Kitchen-ranges, with or without ovens, boilers and salt kitts', together with smoke jacks, spits, and other related articles,¹¹⁴ but it is by no means certain that he actually produced any of these, and in 1840 Major Mitchell was planning to buy 'an improved Kitchen range' while in England.¹¹⁵

In about 1815 W Farlar, a London ironmonger, was selling a 'New Steam Kitchen Range, Improved Oven, and Self-Acting Smoke Jack; together with an improved Warm Bath'. The range was 4 ft 8 ins [1.4 m] across, with a large open grate at the centre, and with horizontal bars across. To one side was a box-like boiler with a tap on the front, which would have supplied hot water for the bath. To the other side was another boxed section, and on top of it the baking oven, with a single door. All this was within a standard kitchen fireplace, but outside it to one side was illustrated the hot closet, a unit with a pair of doors at the front, and on top two steamers, each with two saucepans set in (and the text refers to the advantages of steaming vegetables). Farlar claimed that the open fire for roasting was 'preferable to an iron or Rumford roaster, or a range with a fixed or close Fire,' by which the meat was either sodden and under-cooked, or 'dried to a chip'. Within the roasting grate is shown an apparatus with a wheel, which would appear to turn the meat on a vertical axis. The

¹¹⁰ Alison Ravetz, 'The Victorian Coal Kitchen and its Reformers', *Victorian Studies*, I, 4 (June 1968), pp 476-7.

¹¹¹ Loudon, *Encyclopaedia of Cottage, Farm and Villa Architecture*, [§592], pp 292-3.

¹¹² Terence Lane & Jessie Serle, *Australians at Home* (Melbourne 1990), p 7.

¹¹³ 'List of Fixtures', Mrs Bent to John Campbell, Government Secretary, 17 December 1816, *Historical Records of Australia*, I, 9, p 302, quoted in James Broadbent, 'Aspects of Domestic Architecture in New South Wales 1788-1843' [3 vols, PhD, Australian National University 1985], I, p 77.

¹¹⁴ *Hobart Town Foundery and Smithery*, printed flier c 1845, Allport Library, Hobart, reproduced in Brian Turner, *Australia's Iron Lace* (Sydney 1985), p 37.

¹¹⁵ Diary of T L Mitchell, 1842, MLC59, in James Broadbent, 'Aspects of Domestic Architecture in New South Wales 1788-1843' [3 vols, PhD, Australian National University 1985], I, p 429, hence in Terence Lane & Jessie Serle, *Australians at Home* (Melbourne 1990), p 13.

connection to the smoke jack, which would be in the chimney above, is not apparent.¹¹⁶

By the 1840s a Brown's Patent Cooking Stove - which is in fact a range - was the housewife's desire. Brown was a manufacturer at Luton in Bedfordshire, and his range was recommended by J C Loudon as being very economical of fuel, and cheaper than others of similar design.¹¹⁷ Georgiana McCrae had one sent out in 1842,¹¹⁸ but only to have it sold two years later along with her house 'Mayfield', near Melbourne.¹¹⁹ By 1851 the company had become Brown & Green.¹²⁰ Another of Brown's stoves was installed at Octavius Brown's 'Como'.¹²¹ W & P Steele of Edinburgh made 'improved kitchen ranges', and their reference in 1851 to these as being 'now in full operation' suggests that they only recently developed.¹²² They have not been identified in Australia. Others were shown at the Great Exhibition by William Ellis, W N Nicholson, Charles Halstead, Benham & Sons (the Oxford Roasting Range), Jeremiah Evans¹²³ and Francis Wakefield (the Sherwood).¹²⁴ Another prominent maker was Russell, though it is uncertain whether this refers to the Tasmanian Russell, mentioned above, or to another English maker. In 1853 'the contents of Vauclose House' in Sydney were offered for sale, including a 'Large Russell's cooking apparatus',¹²⁵ readvertised a few months later as a 'Russels patent fire range and stove',¹²⁶ and the 'Chateau Blair' in the Melbourne suburb of Richmond had a 'Russells Patent Cooking Grate',¹²⁷ and in 1862 there was a 'Russell's Cooking Stove' at 'Oak Hill' in what is now the Melbourne suburb of Preston.¹²⁸

Near the top of the scale must have been the products of Sidney Flavel of Leamington, England. The difference in the Flavel or Leamington range was that the central fire was no longer open, but had an iron plate across the top, and led to a sealed chimney.¹²⁹ Loudon reported that in the district of Leamington open fireplaces were 'entirely laid aside' in many villa kitchens. The fire was made on a raised hearth or brick bench, and had an iron plate across the top, within which was an opening about nine inches [230 mm] in diameter fitted with a lid which could be removed

¹¹⁶ W Farlar, 'Farlar's New Steam Kitchen Range, Improved Oven, and Self-Oiling Smoke Jack; together with an Improved Warm Bath, &c' [flier] (London 1815), passim.

¹¹⁷ Loudon, *Encyclopaedia of Cottage, Farm and Villa Architecture*, [§2532] p 1279.

¹¹⁸ Hugh McCrae [ed], *Georgiana's Journal* (Sydney 1934), p 56 (28 May 1842).

¹¹⁹ *Port Phillip Gazette*, 24 February 1844, p 3.

¹²⁰ Great Exhibition, *Catalogue*, I, advertisements, p .

¹²¹ Referred to in an auction notice in the *Argus*, 6 December 1863, cited in Allom Lovell & Associates Pty Ltd, *Como: an Historic Structure Report* (Melbourne 1982), appendix A.

¹²² Great Exhibition, 1851, *Catalogue*, I, advertisement p 40; II, p 598.

¹²³ Great Exhibition, 1851, *Catalogue*, I, II, pp 601-3. A stove and range by Benham of Wigmore St, London, survive in the kitchen of 'Burghley House', Lincolnshire, inspected 2006.

¹²⁴ Great Exhibition, 1851, *Catalogue*, I, II, p 640.

¹²⁵ *Sydney Morning Herald*, 19 March 1853.

¹²⁶ Phyllis Murphy, 'The Colonial Kitchen' in Robert Irving [ed], *The History and Design of the Australian House* (Melbourne 1985), p 236, quoting a letter from the Director of the Historic Houses Trust, 15 June 1982.

¹²⁷ *Argus*, 19 March 1853, p 4.

¹²⁸ 'Oak Hill, Parish of Jika', survey of the house and land by William Malcolm, 1862, La Trobe Collection, State Library of Victoria.

¹²⁹ Ravetz, 'The Victorian Coal Kitchen', pp 439/442.

when broiling was to be done.¹³⁰ By 1851 a version of this, Flavel's 'kitchener or cooking grate', consisting of a small fire placed between two large ovens, was claimed to be remarkable for its economy of fuel,¹³¹ and this seems to have been the 'cooking apparatus' for which he received a prize medal and special approbation at the Great Exhibition, London, in 1851.¹³² Flavel again showed his kitchener, now with grilling apparatus, at the Sydney International Exhibition of 1879 and the Melbourne International Exhibition of 1880-1.¹³³ As illustrated in 1879 it differed only in point of detail from its appearance in 1851.

It was only a step from this to the creation of the close range, commonly referred to as a 'kitchener', by the partial closing in of the front of the fire.¹³⁴ Very similar, to all appearances, was the Litchfield Range, patented by one Wright in 1866. The only apparent differences are that the top could be opened up to expose the fire when this was required by the cooking process; that the flue at the back was behind iron panels, the lower of which could be removed; and that the existence of other panels around the back and sides of the recess, above the height of the cooking surface, seems to indicate that there were hot water boilers in these locations. This model was still being sold at the end of the century.¹³⁵

In 1860 E C Wheelock & Co of Melbourne advertised a range virtually identical with that showed by Flavel at the 1851 Exhibition,¹³⁶ and the Flavel's Patent Cooking Range, used in Parliament House, Brisbane, in 1865-6,¹³⁷ was presumably a version of it. In New Zealand Lady Barker rejoiced in the fact that her new house in the Malvern Hills was equipped with a 'Leamington Range'.¹³⁸ In 1870 'Yarra Bank' and in 1871 'Woodside', both houses in the Melbourne suburb of South Yarra, were advertised as having Leamington ranges,¹³⁹ and as late as 1874 Philip Russell's 'Chiverton House', in the Melbourne suburb of St Kilda, was advertised for sale with a Leamington range.¹⁴⁰

Thomas Watts's drawings for Docker's houses at Elwood, referred to above, include a kitchen range which approaches what later became the standard form. It is 5 ft 6 in high by five feet wide [1.65 x 1.5 m] and has a rectangular boiler to one side.¹⁴¹ This range does not seem closely related to Flavel's, and the roasting apparatus and hot closet are, so far as one knows, *sui generis*. A house built in 1859 boasted a range

¹³⁰ Loudon, *Encyclopaedia of Cottage, Farm and Villa Architecture*, [§2029] p 1018.

¹³¹ Great Exhibition of the Works of Industry of all Nations, 1851, *Official Descriptive and Illustrated Catalogue* (3 vols, London 1851), II, pp 596-7.

¹³² *Illustrated Exhibitor* (London 1851), p xxxiii.

¹³³ Sydney International Exhibition 1879, *Official Catalogue of the British Section* (London 1879), p 10; Melbourne International Exhibition, 1880, *Official Catalogue of the Exhibits* (Melbourne 1880), p 275.

¹³⁴ Ravetz, 'The Victorian Coal Kitchen', pp 444-5.

¹³⁵ Brian Roberts, *The Quest for Comfort* (no place or date [London 1977]), p 16.

¹³⁶ *Age*, 1 September 1860, p3; also *Melbourne Punch*, XII, 304 (23 May 1861).

¹³⁷ *Builder*, XXIV, 1243 (1 December 1866), p 885.

¹³⁸ F N Barker, *Station Life in New Zealand* (Auckland 1973 [1883]), p 64-5.

¹³⁹ *Argus* 12 November 1870, p 3; 11 March 1871, p 2.

¹⁴⁰ *Argus*, 24 October 1874, p 3.

¹⁴¹ Drawings for two houses at Elwood for the Reverend Joseph Docker, Docker papers, Manuscripts Collection, State Library of Victoria.

with a 'self-supplying' boiler,¹⁴² suggesting that it was connected to the reticulated water supply, and that this was a luxury. Otherwise boilers would traditionally be filled by baling, or by a manually operated tap from a header tank. An unidentified stove branded 'Williams / Helston' is in the Edward Willis house, Fitzroy, Victoria, and may or not be original to the house, which dates from 1854, or to the detached kitchen in which it is found, possibly somewhat later. Helston is a town in Cornwall, presumably the place of manufacture.¹⁴³

There were numbers of local variations and improvements in ovens and ranges, which need not be considered here.¹⁴⁴ F Wallis was later claimed to have 'started the manufacture of kitchen ranges and colonial ovens' on reaching Melbourne in 1852,¹⁴⁵ which is more or less consistent with the fact that the official statistics for Victoria indicate the existence of a local stove manufacturer by 1855. His firm seems to have become F Wallis & Sons by 1876, and Wallis Bros & Co before 1880. A stove under this latter style survives in a house at 49 Prospect Hill Road, Canterbury, Melbourne, known to date from before 1881.

The 1860s was the watershed period for the local manufacture of cooking stoves and kitchen ranges. R J Polglaze of the Crown Iron Works in Melbourne was advertising patent kitchen ranges of his own manufacture in 1859.¹⁴⁶ In 1861 G Slade of the Eagle Foundry, East Collingwood, was able to exhibit an 'Economical Cooking Range' of his own design.¹⁴⁷ By the time of the Intercolonial Exhibition of 1866-7 the demand was said to be immense, and one manufacturer was producing over two thousand stoves a year. Local makers were said to have successfully adapted overseas designs for wood fuel, their workmanship was good, and they were generally using wrought rather than cast iron, for the sake of lightness and strength.¹⁴⁸ Thomas Nelson's 'Enclosed Self-acting Kitchener, Three-oven Range, with Grill' was favourably regarded by the judges, particularly because 'the usual fire lumps that generally compose the sides of the fireplace' were replaced with high pressure boilers to supply hot water to the kitchen, scullery and bathrooms, together with a steam boiler at the back.¹⁴⁹ A 'high pressure range' was to be found at a house in Alphington in 1882,¹⁵⁰ but was probably not unusual at this date.

By 1875 two alone of the Melbourne oven and stove manufacturers were producing goods valued at £6,600 and £4,700 respectively, the one employing six men and seven boys and the other, surprisingly, eleven men and seven boys.¹⁵¹ One of these was probably Whitney Chambers & Co, and the other may have been Frederick

¹⁴² *Argus*, 28 September) 1861, p 2.

¹⁴³ Information from Laurie O'Brien, 2002.

¹⁴⁴ For example Edmund Ashley's Self-Basting Meat-Roasting Machine: Intercolonial Exhibition of Australasia, *Official Record* (Melbourne 1867), p 29. Generally, see Miles Lewis, 'Tradition and Innovation in Victorian Building' (3 vols, PhD, University of Melbourne 1972), II, pp 475-7.

¹⁴⁵ Alexander Sutherland [ed], *Victoria and its Metropolis* (2 vols, Melbourne 1888), II, pp 621-2.

¹⁴⁶ C B Mayes, *The Victorian Contractors' and Builders' Price-Book* (Melbourne 1859), p xxv.

¹⁴⁷ Victorian Exhibition 1861, *Catalogue with Prefatory Essays* (Melbourne 1861), p 219.

¹⁴⁸ Intercolonial Exhibition, *Official Record*, p 328.

¹⁴⁹ Intercolonial Exhibition, *Official Record*, pp 328-9.

¹⁵⁰ *Argus*, 14 October 1882, p 2.

¹⁵¹ Victorian Intercolonial Exhibition 1875, *Official Catalogue* (Melbourne 1875), , p 144.

Pullinger. Pullinger had reached Melbourne in 1855 and worked for sixteen years for the ironmongers Langwill Craig & Co (big importers of American stoves in the 1850s), then started his own business in Flinders Lane in 1871, employing only one boy. By 1876 his business had burgeoned and he moved to larger premises in the same street, and by 1888 he employed between fifteen and twenty hands and had a turnover of about £5,000 a year. He confined his activities entirely to making ranges, and supplied these to many large clubs, hotels and mansions, including the government houses of both Melbourne and Sydney.¹⁵² One of his ranges survives at 'Monaro Vale' homestead in the Riverina of New South Wales,¹⁵³ and others at 'Como', Melbourne; 'Memsie', Bridgewater,¹⁵⁴ and 'Hartpury' in Elwood, a house which dates from 1865-6, so that the stove cannot be original. For Sir William Clarke's 'Cliveden' Pullinger made a 5 ft 6 in [1.65 m] range with Minton tiles 'all round the sides, back and moulding',¹⁵⁵ and at the Esplanade Hotel, Queenscliff, there were Pullinger patent ranges, steaming apparatus and food lifts.¹⁵⁶ Pullinger was not without rivals. Green & Brown of Launceston won a first order of merit at the Centennial Exhibition of 1888-9 for their patent 'Shamrock' kitchener,¹⁵⁷ and A Simpson & Sons of Adelaide showed the 'Economic cooking range', of which nothing is known, as well as kerosene cooking stoves and ranges.¹⁵⁸

f. incinerators

Domestic incinerators have never played a great role in Australia, but in 1922 the Kernerator was being marketed by the American Wall Bed Co of Sydney,¹⁵⁹ and in 1935 by what was now the Kernerator and Wall Bed Co of Sydney, as well as by Norman Brook of South Melbourne, and by James Campbell & Sons of Brisbane. It was a built-in incinerator which presented a square hole in the wall surface.¹⁶⁰ By 1949 the company was Kernerator Incineration, of Alexandria, with representation in other states. The incinerator was claimed to be 'a product of the largest incineration company in the world', and it does not seem to have had any Australian content. Though the brand was registered with the Australian Patent Office there is no reference to any Australian factory, and even the literature is not geared to Australian conditions, as in 'Ordinarily, where there is a basement in the residence...'¹⁶¹ Flat blocks were probably the major customers in Australia, one example being

¹⁵² Alexander Sutherland [ed], *Victoria and its Metropolis* (2 vols, Melbourne 1888), II, p 617.

¹⁵³ Inspected January 2000.

¹⁵⁴ Inspected 2004.

¹⁵⁵ Terence Lane & Jessie Serle, *Australians at Home* (Melbourne 1990), p 34.

¹⁵⁶ A Whitney & Chambers kitchener was in the servants' dining room of 'Airlie', East Melbourne, when the house was offered for sale in 1888: *Argus*, 18 February 1888, p 16.

¹⁵⁷ Centennial International Exhibition, Melbourne 1888-1889, *Official Record* (Melbourne 1890), p 893.

¹⁵⁸ Centennial International Exhibition, *Official Record*, p 556.

¹⁵⁹ *Building*, 12 October 1922, p 40.

¹⁶⁰ J P Brogan, *101 Australian Homes* (Sydney, no date [c 1935]), p 122.

¹⁶¹ F W Ware & W L Richardson [eds], *Ramsay's Architectural and Engineering Catalogue* (Melbourne 1949), § 51/4.

'Maretimo', South Yarra, in 1939. Here there were chutes from the landing to take all the rubbish to the basement furnace (not necessarily a Kernerator).¹⁶²

g. kerosene

By 1851 a mineral oil obtained by distilling tar oils from a coal pit at Riddings, near Alfreton in England, had been given the name 'paraffine' [*sic*] from its lack of affinity for other substances, and had come into extensive use as a lubricant for machinery.¹⁶³ In 1853 a 'fluid called *Kerosene*' obtained from asphaltic rock in New Brunswick, USA, was used to generate gas, apparently by firing pressurised air through it. By way of demonstration, the gas was used to light the Art Union Building, New York.¹⁶⁴ In 1854 the Canadian Abraham Gesner patented a process for distilling oil from coal, which he also called 'kerosene', but was otherwise known as 'coal oil'. After the discovery of oil at Titusville, Pennsylvania, in 1859, kerosene could more easily be refined from petroleum,¹⁶⁵ and this was exported as 'paraffin'.¹⁶⁶ Given the decline in the whaling industry and the consequent cost of whale oil, it is not surprising that kerosene quickly found a market for lighting purposes.

The first kerosene and kerosene lamps were imported to Melbourne by T W Stanford, arriving in the *Mary Bangs* on 13 March 1860.¹⁶⁷ By 1861 kerosene was being used at the Limestone Plains, near what is now Canberra,¹⁶⁸ and by 1863 the 'Kerosene Establishment' had been built on the south side of the Yarra in Melbourne.¹⁶⁹ W B Jones's Waverly Bond and kerosene stores were established in Maffra Street two years later, and some later structures survive on the site. In 1879 Young's Paraffin Light and Mineral Oil Company at Glasgow had agents in New South Wales, Mason Brothers, which suggests a substantial local business.¹⁷⁰

Local production from shale began in 1865 at Mt Kembla and Hartley Vale. Mt Kembla produced more than a thousand tonnes in 1866, and up to three thousand tonnes a year during the next decade. At the Intercolonial Exhibition of 1866-7 John Graham of Sydney showed a block of kerosene shale from Wollongong and a case of 'Pioneer' brand kerosene oil. The Hartley Kerosene Oil and Paraffine Company

¹⁶² W Arthur, 'Melbourne's Latest Group of Modern Flats: Perpetuating the name of an Historic House', *Australian Home Beautiful*, VIII, 10 (1 October 1930), p 15.

¹⁶³ Great Exhibition, 1851, *Catalogue*, I, p 187.

¹⁶⁴ *Builder*, XI, 568 (24 December 1853), p 774.

¹⁶⁵ Mimi Sherman, 'A Look at Nineteenth-Century Lighting: Lighting Devices from the Merchant's House Museum', *APT Bulletin*, XXXI, 1 (2000), p 41.

¹⁶⁶ Lane & Serle, *Australians at Home*, p 387, ref R Field, *Irons in the Fire* (Wiltshire 1984), pp 131-4. Lane and Serle date the first extraction of kerosene to 1850, and its production from petroleum to 1858.

¹⁶⁷ Winston Burchett, *East Melbourne 1837-1977* (Melbourne 1978), p 119. See also *Illustrated Australian News*, 2 January 1871), cited in Michael Cannon, *Life in the Cities* (West Melbourne 1975), p 102. See also Victorian patent no 1097 to Thomas Welton Stanford, 9 March 1868, for improvements in the construction of lamps.

¹⁶⁸ Lane & Serle, *Australians at Home*, p 387, ref D Dolan, 'Around the Auctions: Queanbeyan in the 1860s', *Australiana*, VII, 1, pp 22-3.

¹⁶⁹ Lane & Serle, *Australians at Home*, p 387, ref R Chirnside to T Chirnside, 24 December 1863, Chirnside papers, MS 11127, La Trobe Collection, SLV.

¹⁷⁰ Sydney Exhibition 1879, *Catalogue of British Section*, p 90.

(Limited) showed cannel coal or kerosene shale from the Hartley mine and tins of 'burning oil' or kerosene, and the Western Kerosene Oil Company also showed kerosene shale from Hartley. William Keene, the New South Wales Examiner of Coal Fields, showed (*inter alia*) kerosene shale from Colley Creek, Liverpool Plains, and Burraborang near Picton.¹⁷¹ The industry expanded fairly continuously until the twentieth century, but virtually died out between the two world wars, and was then briefly revived during and immediately after World War II.¹⁷²

Lighting by oil had already been greatly improved by the introduction of the Argand lamp, in which the wick was a hollow cylinder and the oil was wholly consumed, with little or no smoke or smell.¹⁷³ At the 1875 Victorian exhibition Douglas and Cameron showed as 'kerolier' amongst their other fittings, James Riddell showed reflecting lamps and reflectors for both gas and kerosene, John Danks also showed reflectors for both fuels, and James Prince of Melbourne showed Sibley's patent kerosene lamp and 'cooking apparatus'.¹⁷⁴ Kerosene was far less popular as a fuel for cooking purposes, but kerosene stoves were portable, and Ripplingille's model, mentioned above, was being advertised in Australia in the 1880s. Others by local makers such as Simpson of Adelaide, also mentioned above, were shown at the Centennial Exhibition. By 1929 one could buy the Perfection Oil Cook [*sic*] stove, which had been 'built by men, but designed by a woman to meet the needs of women'.¹⁷⁵ This was the main type marketed by D & W Chandler of Melbourne, but there were also others such as the Queen of Scots and the Handy Outdoor Stove.¹⁷⁶

Oil heating was being promoted in the 1920s by companies like William's Oil-O-Matic of Melbourne,¹⁷⁷ and after World War II individual oil-fuelled room heaters became common. The Vulcan claimed to have a 'revolutionary world patented stainless steel blue flame smokeless burner' as well as electric ignition and other convenient features.¹⁷⁸

h. heating systems

William Strutt had used hot air to heat the Derby Mill in 1792-3, and probably helped his friend Charles Sylvester in the design of the system used at the Derby General Infirmary in about 1810.¹⁷⁹ Numerous exercises in air heating followed in Britain, but in Australia, with a milder climate, nothing of the sort seems to have been

¹⁷¹ Intercolonial Exhibition, *Official Record*, pp 60-61.

¹⁷² Ian Jack, 'Oil and Shale' in Judy Birmingham et al, *Australian Pioneer Technology* (Richmond [Victoria] 1979), pp 120-122.

¹⁷³ *Cassell's Household Guide to every Department of Practical Life* (4 vols, London, no date [1869-71]), III, p 2.

¹⁷⁴ *Official Catalogue of Exhibits, Victorian Intercolonial Exhibition, Melbourne, 1875* (Melbourne 1875), pp 145, 147.

¹⁷⁵ Alex Smith, *The Australian Home Carpenter* (Melbourne 1929), p 125.

¹⁷⁶ Chandler, [catalogue], p 86.

¹⁷⁷ *Australian Homes* (Melbourne 1927), pp 141-5. See also *Ramsay's Catalogue* [1949], § 40/2

¹⁷⁸ *Australian House and Garden*, December 1965, p 105.

¹⁷⁹ Charles Sylvester, *The Philosophy of Domestic Economy* (Nottingham c 1810), cited in Elton Engineering Books, *Catalogue Number 13* (London 1998), pp 57-8.

attempted. Even heating stoves were probably rare, though they were fairly often used in prefabricated houses. Manning, the London manufacturer, supplied as an optional extra a room heating stove which was made of wrought iron, rather than the more usual cast iron, so as to save weight.¹⁸⁰ However Samuel Vaughan, who came out with a Manning house, recorded that he had obtained from Farmer and Gorbell of London 'An emigrants Stove. 6 Feet piping + an Elbow with Set of Utensils fitted complete.'¹⁸¹

Dr Arnott, of ventilation fame, also invented a 'self-regulating' stove which by 1851 was being manufactured by Frederick Edwards of London, and which was claimed to be economical of fuel and to distribute an even heat. The stove was regulated either by Arnott's 'balanced valve' or his 'thermometer'. The balanced valve, as on the stove shown by Edwards at the Great Exhibition, was a second valve which tended to be closed by the air current towards the fire, but held open by a weight calculated so as to allow just enough air to still enter. His 'thermometer' was not just a temperature gauge but an auto-serve mechanism which closed a throttle valve when the temperature reached the required point, restricting the entry of air and damping down the fire.¹⁸²

At a larger scale the Gill Stove, patented by John Sylvester, seems to have been designed for heating large spaces or complete buildings. It was manufactured by Stuart & Smith of Sheffield in a functional form for installation in a basement, and an ornamental quasi-Gothic one to be installed within a room.¹⁸³ At 'Carranballac', Victoria, an 'Excelsior No 1' heating stove survives in the basement, the origin of which is unknown. In 1859 the architect R A Love proposed to heat the second and third floors of the Bendigo Benevolent Asylum with a hot air installation 'after the ideas of Mr Chilton, of Boston, U.S.A.'. There was to be a furnace surrounded by a large air chamber, and the furnace was to be fired to a moderate temperature so that the air drawn in from outside was 'only heated rather than being burnt or decomposed.' It was admitted to any given room using a turnable valve, in combination with cold air controlled by another valve, so as to guarantee 'a very healthy, agreeable temperature'.¹⁸⁴

Love had been in the United States, and doubtless drew on his own experience, but the Chilton stove had also been illustrated in A J Downing's *Architecture of Country Houses*, a book which was well-known in Australia. It is shown as consisting of a firebrick lined grate, an iron container above the fire in which the air was heated, and air pipes leading off from it.¹⁸⁵ The idea that rooms should be heated by introducing large quantities of moderately warmed air, rather than small quantities of hot air, was also one of the two main propositions advanced by Henry Ruttan of Canada in his

¹⁸⁰ J C Loudon, *Encyclopaedia of Cottage, Farm and Villa Architecture and Furniture* (London 1853 [1833]), p 252.

¹⁸¹ Journal of Samuel Vaughan, La Trobe Collection, State Library of Victoria.

¹⁸² Neil Arnott, *On Warming and Ventilating, &c* (London 1838), pp 39-57.

¹⁸³ *Builder*, XI, 547 (30 July 1853), p 495.

¹⁸⁴ Frank Cusack, *Candles in the Dark: a History of the Bendigo Home and Hospital for the Aged* (Carlton [Victoria] 1984), pp 30-31, quoting 'Architect's Report' in the *Second Annual Report of the Benevolent Asylum*, 1859. Cusack, p 37, confirms that the Chilton heating was in fact connected to all rooms.

¹⁸⁵ A J Downing, *The Architecture of Country Houses* (New York 1850), pp 477-8.

patent and in his book of 1862. Ruttan's patent rights in the United States were bought by a group of Illinois businessmen in 1866, and the company they established, William A Pennell & Co, was to evolve into that of Isaac Smead, who by 1889 was the largest manufacturer of warming and ventilating systems in the United States.¹⁸⁶

The use of hot water radiators, though pioneered by the Marquis de Chabannes early in the nineteenth century, was generally a development of much later date in Australia. However the principle was applied as early as 1856 in the Houses of Parliament, Melbourne. Here the Legislative Assembly Chamber was heated in winter by means of hot water circulating in pipes supplied from a large underground tank.¹⁸⁷ Hot water was used to heat greenhouses and conservatories, before it was used for central heating generally. In 1883 the glass houses of 'Rippon Lea', Melbourne, were reported to be heated by means of hot water piped from a 'Deard's Patent Boiler'.¹⁸⁸ This was a form of coil boiler in which the coil was not of wrought iron, as was the norm, but of cast iron, and in which the rings of the coil were set together with no space in between, so that the flame was kept entirely within. This increased the surface in contact with the heat, and was claimed to produce better results.¹⁸⁹ The 1889 catalogue of Boulton & Paul of Norwich reports that B W Chandler and the Hon H Miller of Melbourne had each bought the company's no 4 boiler¹⁹⁰ (Miller's was probably for his house 'Findon').

Some of the examples would have been conventional shell boilers, but others relied upon tubes carrying the water through a furnace, an idea even older than Strutt's reticulation of hot air. In 1866 William Blakey, of Britain, made an apparatus in which tubes passed through a furnace, alternately at opposite angles, and were connected by smaller pipes at the ends. The first successful tubular boiler, however, was not Blakey's, but that of the American James Ramsay, who in 1788 received a British patent covering boilers of various forms, one of them a coiled tube within a cylindrical fire box, linked with an annular water jacket surrounding the cylinder. This was the first of the coil boilers, while another of Ramsay's designs was what was to become known as the vertical tube boiler.

There were various other developments. The first water tube boiler with fire tubes inside the water tubes was that of Summers & Ogle in 1830, and the first with inclined water tubes connecting with spaces at the front and back was Stephen Wilcox's, of 1856. It was from the latter that the boilers of Babcock & Wilcox developed, the canonical model dating from 1867.¹⁹¹ At the Centennial Exhibition in Melbourne, in 1888-9, a number of British boilers were shown, notably those of Babcock & Wilcox of Glasgow, who were soon to become prominent on the local

¹⁸⁶ I D Smead, *Ventilation and Warming of Buildings* (Toledo [Ohio] 1889), pp 7-8.

¹⁸⁷ *Argus*, 17 April 1856.

¹⁸⁸ *Leader*, 1 December 1883, quoted in John Foster, *Victorian Picturesque* (Melbourne 1989), p 64.

¹⁸⁹ John Hood, *A Practical Treatise upon Warming Buildings by Hot Water* (3rd ed, London 1897), pp 257-8.

¹⁹⁰ Information from Tracey Avery, June 2003, citing Boulton & Paul's catalogue no 45 of May 1889, no 11 in the Boulton & Paul Archives, Norwich Record Office, 5/10/1998.

¹⁹¹ Babcock & Wilcox Co, *Steam its Generation and Use, &c* (New York 1891 [1879]), p 29, apparently based upon a discussion by George H Babcock of a paper by Sterling on 'Water-Tube and Shell Boilers', VI, p 601.

scene. Their 'patent water-tube steam boilers' were awarded a gold medal,¹⁹² and by 1894 they had their own branch in Sydney.¹⁹³ By now they had supplied industrial boilers to a number of major enterprises in Melbourne and elsewhere in Australia,¹⁹⁴ and we can assume that there many more commercial residential and greenhouse installations.

A major improvement in Britain was Thomas Potterton's boiler, patented in 1894. It was a rectangular boiler, the sides and top of which were hollow and contained water. Instead of the hot gases passing straight into the flue, they were made to step down through the water jacket before rising again, in the process of which much more of their heat was captured.¹⁹⁵ The Potterton boiler has not so far been documented in Australia. By contrast, 'Ideal' products are ubiquitous, this being the brand of the National Radiator Company of Hull, England. At 'Holey Plain', Victoria, the 'Ideal' boiler of the conservatory survives, possibly from the early twentieth century. An Ideal no 525 boiler survives in the basement of 'Purrumbete', Victoria, where it served to heat the house, using solid fuel. John Danks & Son, of Melbourne and Sydney, illustrate three 'Ideal' boilers in their catalogue of 1906,¹⁹⁶ but state that 'All the Boilers and Radiators are made in Special Cast Iron by the American Radiator Co, for whom we are sole agents in Australia'. It is possible that this was merely an ill-expressed reference to the extensive range of boilers which they advertised in a separate catalogue, and not to 'Ideal' range - certainly later Danks literature on Ideal boilers makes no mention of an American or any other overseas connection.¹⁹⁷ They were still selling Ideal boilers in the early the 1940s,¹⁹⁸ but by 1949 Ideal boilers and radiators were distributed by Shanks & Co of Melbourne, and Swans Ltd of Sydney.¹⁹⁹ A competing product, apparently of local origin, was the Hammel gas steam radiator of Hammel Heating Pty Ltd, Melbourne, which by 1936 had been installed in a number of prominent Victorian buildings.²⁰⁰ Pacific Heating also made gas steam radiators, together with a number of other appliances.²⁰¹

John Danks referred to 'the tremendous strides that have taken place in heating buildings by hot water':

192 Centennial International Exhibition, *Official Record*, pp 891, 975.

193 Babcock & Wilcox, *Steam*, frontispiece.

194 The Electric Light and Power Company and the Fitzroy and Richmond lines of the Melbourne Tramways [Babcock & Wilcox, *Steam*, p 123], the Australasian Sugar Refining Company [p 127], the Austral Otis Elevator & Engineering Co [p 132], the Dight's Falls Waterworks, the Crown Street Station Waterworks, Sydney, the Hydraulic Station, Newcastle [p 133], the Queensport Brick & Tile Co, Brisbane, John Sharpe & Sons, wood works [p 138], Cunliffe & Paterson, fruit preservers [pp 138, 144], James Miller & Co rope works [p 142], the W M Foster Brewery, and the tobacco factories of Moss, White & Co, Wm Cameron Brothers & Co and Dudgeon & Arnell [p 144], the Giant's Den Mining Company, Sydney, and the Pioneer Gold Mining Company of Yalwil, NSW [p 145], and Lewis Samuel, merchants, Sydney [p 148] (all Melbourne where not otherwise stated) .

195 British patent no 5182 of 13 March 1894, reproduced in Roberts, *The Quest for Comfort*, pp 18-19.

196 John Danks & Son, *'Daspyl' Plumbers' and Engineers' Supplies* (Melbourne 1906), pp 181-4.

197 John Danks & Son Pty. Ltd., *Ideal Hot Water Supply* (Melbourne, no date), passim.

198 *Australian Home Beautiful*, January 1941, p 42.

199 *Ramsay's Catalogue* [1949], § 38/1.

200 *Journal of the Royal Victorian Institute of Architects*, xxxiv, 4 (September 1936), p iii.

201 *Journal of the Royal Victorian Institute of Architects*, xxxiv, 4 (September 1936), p xxiii.

The fact that a building, no matter how large, can be efficiently and thoroughly heated by one fire, that expensive chimneys, mantel-pieces, grates, &c., can be omitted, and that all the dirt, dust, ashes, and cleaning caused by the fires is done away with, are facts now well known. In cities, where building space is so valuable, the extra room gained by leaving out chimney flues and fireplaces, is an item that alone demands serious consideration, and the inducement to intending tenants that rooms are well warmed, will always bias them to rooms heated in this manner. Another advantage is that ventilators can be placed at the back of or under Radiators to admit fresh air, which is warmed before being diffused through the room, without having the oxygen burnt out of it, as is the case in Gas or Kerosene Stoves.²⁰²

At a sophisticated engineering level, George Vincent, of Melbourne and Sydney, dealt in both low pressure gravity systems and 'Reck' accelerated heating systems. He claimed over sixty installations in Melbourne, Sydney, Adelaide, Perth, Launceston, the Australian Capital Territory and Christchurch.²⁰³ Hot water radiators came in the various tubular forms which are well-known, but were always recognised as being intrusive and more or less ugly, as well as prone to collect dust and rubbish. Various forms of cases, guards or screens were developed, but between the wars there appeared the panel type, in which no discrete pipes were visible, but only a flat rectangular surface with a waffle pattern of recessed planes, as in the Ideal 'Classic'.²⁰⁴ There was even a type, the Ideal 'Rayrad' which had a completely plane face set within a moulded frame.²⁰⁵ In Australia Gardner & Naylor Pty Ltd of Melbourne appear to have developed their own 'Garnay' panel and convection systems, designed to be flush mounted in a wall surface.²⁰⁶ The baseboard heater, which originated in the United States and had reached Britain by the early 1950s, must have appeared in Australia not long afterwards. This was a metal skirting with a heating element behind, which heated by both radiation and convection, for the metal surface radiated heat and air was warm was warmed by entering the base of the skirting and passing out the top. A more specialised development of the panel heater, which may or may not have reached Australia, was the Frenger ceiling panel, in which perforated metal plates were clipped onto a grid of overhead pipes.²⁰⁷

Domestic hot water was commonly provided by the more elaborate kitchen ranges, discussed above, but in the laundry a fire was set beneath the washing copper. Water for bathing was generally brought manually - or very occasionally piped - from the kitchen until late in the century, when the chip heater appeared. The 'instantaneous water heaters', which were being sold by Douglas & Sons of Melbourne by 1888 were probably of this sort. In 1892 the Melbourne ironfounder Angus McLean was advertising as the sole proprietor and manufacturer (presumably for Victoria) of

²⁰² Danks, *'Daspyl' Plumbers' Supplies*, p 180.

²⁰³ *The Architectural Students Annual* (Melbourne 1913), p xxvii,

²⁰⁴ A A Jones, *Modern Heating and Ventilation* (3 vols, London, no date [c 1930]), I, p 102.

²⁰⁵ Jones, *Modern Heating and Ventilation*, I, facing p 103.

²⁰⁶ *Journal of the Royal Victorian Institute of Architects*, XXXIV, 4 (September 1936), p 1v; Robin Boyd, *Victorian Modern* (Melbourne 1947), advertisements, no page.

²⁰⁷ J R Kell, 'Heating of Larger Buildings', in Eric De Maré, *New Ways of Servicing Buildings* (London 1954), p 79.

Fischer's Patent Bath Heater, which could be heated with wood in three minutes at the cost of one farthing. Such heaters continued in use long after the introduction of more convenient gas hot water systems, and in the early twentieth century brands included the Royal, Little Hero, Silver Ace, Kangaroo, Empire and Little Wonder, though Douglasses seem by now to have gone over entirely to gas.²⁰⁸

The geyser was a gas fired bath heater which would heat a volume of water (from 2 to 19 litres) by about 22 to 28° Centigrade immediately and continuously. It might be of the sealed type in which the water passed through the heat in thin copper tubes, or of the unsealed type, in which the water flowed in a thin film from one shelf to another, in direct contact with the combustion products (which made it unsuitable for drinking).²⁰⁹ Geysers were available in England during the 1890s in many models - the 'Lightning', the 'Champion', Shanks's 'Tubal', Doulton's 'Paragon', the 'New Rapids', 'Calda', 'Calda Dwarf', 'Liliputian', Wyman's Patent, Maughan's Patent, Fletcher's Patent High Power Instantaneous Water Heater, Fletcher's Rapid Heater, and Fletcher's New Patent Wall Pattern Water Heater & Bath Heater. How many of there were available in Australia it is impossible to say.

By 1914 J Tylor & Sons Ltd of Sydney were the sole Australian agents for Ewart's 'Califont' water heater, which was apparently gas fired, and designed to reticulate hot water to any part of a house.²¹⁰ This is one of the earliest local references to a multi-point water heater, of which the 'Ascot' was soon to emerge as the leading British type.²¹¹ In 1941 Douglas & Co of Melbourne advertised the latest Douglas automatic gas hot water services of the streamline wall type, but the truly advanced form was the "'Brian" Gas-Automatic Water Heater', which supplied boiling water automatically as required, up to 47 gallons [260 l] a day. At the Napier Waller house in Ivanhoe, Melbourne, there survives a mains pressure electric hot water heater of unknown (but relatively early) date, made by Thomas Abbot & Co of Melbourne and Sydney, and branded 'T.H.M.' By 1954 there was a very large range of both mains pressure and storage systems on the local market. Solar heating arrived in the 1950s, and it was reported in 1955 that a CSIRO-designed solar hot water service was being tested in Alice Springs. £60 absorbers fed a seventy gallon [360 l] tank, and would provide hot water throughout the year, in a location where the same effect using electricity would cost £100.

One of the most ubiquitous heating devices of the twentieth century was the 'Wonder-Heat Air-Conditioning Fire', which was simply an updated version of Benjamin Franklin's stove. Though console units were available, it was normally placed in a domestic fireplace. It contained a fire, which could burn any kind of fuel, behind an armour plate glass door. Fresh air was drawn in, typically from the sub-floor space, passed around the outside of the combustion chamber through ducts and across fins, to heat it up, and released into the room from the top of the unit. Thus the hot air

²⁰⁸ Chandler, [catalogue], p 90.

²⁰⁹ E L Oughton, 'Gas Heating', in A A Jones [ed], *Modern Heating and Ventilation* [3 vols, London, no date [c 1930]], II, p 156.

²¹⁰ C E Mayes, *The Australian Builders and Contractors' Price-Book* (8th ed, Sydney 1914), p 10.

²¹¹ Oughton, 'Gas Heating', pp 137-140.

entering the room had its full oxygen content, contained no combustion products, and had little propensity to cause draughts.²¹²

Ducted heating arrived only in 1960. The Melbourne engineer Frank O'Brien began importing ducted heating systems from both Britain and America after seeing the system used in England in 1959. He worked with Craig & Seeley Pty Ltd, after two years obtained a licence to manufacture ducted units locally, and ultimately established Brivis Ltd, one of Australia's largest makers. By 1969 ducted heating was common in industrial and commercial projects and was beginning to make inroads into the domestic market.

At the outset the ducting was made of galvanized iron, rectangular in section and welded at the joints, but subsequently cylindrical tubing was preferred, commonly insulated with asbestos. When the danger of asbestos was realised it was replaced with fibreglass blanket, which was found to cause problems after ten or fifteen years, when particles of fibreglass began to enter the ducting and be distributed with the air. Meanwhile in 1969 the Vulcan company had introduced 'Sidewinder' aluminium ducting, which could easily be bent around corners, and in 1970 they began to perforate it so as to absorb noise from the fan. This type was first used at Tullamarine Airport in 1970. By the early 1980s metal was being entirely replaced with durable polycarbonate components which were joined by 'snaplocking' rather than soldering or welding. Then Vulcan introduced 'Flexiwinder' ducting consisting of a spiral coil of nylon wound through flexible aluminium fabric and encased in a plastic sleeve. This had the merits that it would concertina together for transport, and could be taken through difficult spaces in the installation process.²¹³

The 1955 experimental solar hot water heater at Alice Springs has been referred to. In 1957 the Association for Applied Solar Energy, of Phoenix, Arizona, conducted an international competition for the design of a solar house, and attracted about 1600 entries. Sixty were selected for publication, including three by Australians: R G Fitzhardinge of Sydney, Neville D Quarry, then of London, but otherwise of Melbourne, and Lynton W Reynolds & Alan Hough of Melbourne.²¹⁴ Solar heating now became a live topic in Australia. In 1961 it was reported that R Sheridan and M Juppenlatz, senior lecturers in mechanical engineering at the University of Queensland, had designed a prefabricated solar house. The sun's heat would be collected in water tubes on the roof and stored in a tank at 450° F, or used to drive a refrigerator. This would provide air conditioning, hot water and cooling. A model house was being built for testing on the roof of the Biological Sciences Building at the St Lucia campus. The rights were owned by the University, and private firms would be licensed to build the house, which was estimated to cost only 10 to 15% more than conventional timber houses.²¹⁵

²¹² Ramsay's *Catalogue* [1949], § 39/11.

²¹³ Brett Howlett, 'The Historical Development of Ducted Heating' (BBldg essay, University of Melbourne 1992), pp 4-7.

²¹⁴ Association for Applied Solar Energy, *Living with the Sun, Volume 1, Sixty Plans Selected from the Entries in the 1957 International Architectural Competition to Design a Solar-Heated Residence* (Phoenix [Arizona] 1958), *passim*.

²¹⁵ *Cross-Section*, no 104 (1 June 1961), p 3.