9.06 Earth Closets

deodorising
Moule's closet
Moule's closet in Australia
variant types
the afterglow

deodorising

Sanitary arrangements rarely survive intact, and are very rarely analysed in any detail. The earth closet in particular is generally assumed to be the most primitive of all forms of privy, which is a mistake, for it was in fact a sophisticated device. The idea of drying out and deodorising nightsoil had been explored by the French chemists Payen and Buren, who produced a powder which was claimed to remove the smell and give it the appearance, after subsequent treatment, of a fine black mould. As early as 1839 a plant had been established in London under licence from the French patentees,[1] and their product was perhaps the ancestor of 'Woodward's Patent Deodoriser and Disinfecting Powder', produced by George Woodward of Melbourne.

At the Victorian Exhibition of 1861 Woodward, described as both patentee and manufacturer, showed his 'Victorian Guano' and deodorized nightsoil.[2] At the Intercolonial Exhibition of 1866-7 Woodward exhibited the 'deodorising portable tank night closet or night commode' in which the patent powder was used, and again the 'Victorian guano' which resulted from his process.[3] By 1876 Woodward had the temerity to display his deodorants, deodorized nightsoil, 'guano' and deodorized bone dust at the Philadelphia Centennial Exhibition.[4] At the Melbourne Centennial Exhibition of 1888-9 Sir James Farmer of Salford, Manchester, showed a 'model apparatus for drying sewage and excreta',[5] but there is no particular reason to suppose that this actually reached the Australian colonies.

Moule's closet

The most important development of the period was the closet which was patented in England by the Reverend Henry Moule of Dorset in 1860.[6] In 1858 Moule had

1 *Mechanic's Magazine,* XXXI, 833 (27 July 1839), p 319.
2 Victorian Exhibition 1861, *Catalogue with Prefatory Essays* (Melbourne 1861), p 209.
3 Intercolonial Exhibition, Melbourne, 1866-7, *Official Record* [Melbourne 1867], p 15.
4 Victoria, *Official Catalogue of Exhibits, Essays, &c* [Philadelphia Centennial Exhibition, 1876] (Melbourne 1876), p 94.
5 *Australian Engineering and Building News*, 1 November 1881, p 69.
6 Lawrence Wright, *Clean and Decent* (London 1960), p 208; John Pudney, *The Smallest Room* (London 1954), p 48. Moule's closet is described in the *Builder,* XX, 7331 & 794 (1862), and XXIV, 239 (1866): cited in Wyatt Papworth [ed], *The Dictionary of Architecture* (London 1853-1892), sv Privy.

published pamphlet, *National Health and Wealth,* and this was followed in 1863 with a paper in the journal of the Royal Agricultural Society of England on 'Earth *versus* Water for the Removal and Utilization of Excrementitious matter'. In these he suggested that 1 1/2 pints [850 ml] of dry sifted earth was sufficient to prevent both 'effluvium', or smell, and fermentation which would release noxious gases.[7] The special significance attached to smell and noxious gases reflects the miasma theory of disease, in which these vapours or miasmas were thought to be the agents of infection. The bacterial theory was already superseding this, but change was slow.

It appears that the original patent was taken out jointly by Moule with one Girdlestone, engineer of the Earth Closet Company, and that the closets had begun to be installed in schools and other institutions from at least 1865, and in gaols and military encampments in Bengal from the same time.[8] The closet became legal in England under the *Sanitary Amendment Act* of 1868. About 850 ml of dry loam or clay was deposited each time the closet was used, and it could be dried and re-used twelve or more times before it was removed for use as manure.[9] The receptacle might be a vault, from which the contents would have to be shovelled out; a box on casters; or what was known in England as a 'Broadmoor tank' - apparently a metal container on wheels. In multistorey buildings closets on the upper floors could discharge into vertical chutes.[10]

Another form of dry closet was invented by Dr Lloyd and manufactured by one Smith, of Glasgow, who displayed it at one or more of the international exhibitions of the 1860s. It made use of ashes, or of lime and ashes, rather than dry clay. It was stated that the solid matter in the urine and dung of each person was about five ounces [150 g], and that this was reduced to one or two ounces [30-60 g] in the drying process.[11] A seemingly distinct earth closet system, the 'Goux', was also in use in Britain by 1874, but how it differed is not apparent.[12]

Moule's closet came to Australia at a relatively early date, 1864, and New Zealand no later than 1866,[13] but it was slower to reach the United States. There the first description is said to have been that published in Judd's *Agricultural Journal* for 1868, and within two years of this the system was adopted by Olmsted, Vaux & Co for the complete village of Riverside, near Chicago, and a Dry Earth Co had been established at New Haven, Connecticut.[14] An American farm manual, republished in an Australian edition in 1885, illustrates a version of Moule's closet in which the earth was released automatically when the seat was raised. Its origin, however, had been

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7 G E Waring, *Earth Closets and Earth Sewage* (New York 1870), p 9.

8 Lord Kimberley, Secretary of State for Colonies, to the Officer Administering the Government of Queensland *(Despatch Respecting) the Dry Earth System,* 11 August 1871.

9 *Technical Educator* [3 vols, London, no date], III, pp 341-3.

10 Waring, *Earth Closets,* pp 10-11, 24-5, 28-9, 32-3, &c.

11 R S Burn, *Modern Building and Architecture* (London, no date [c 1870], p 191.

12 John Birch, *Country Architecture* (Edinburgh 1874), p 31, describing rows of "mechanics' dwellings" at Halstead, Essex, built for Samuel Courtauld & Co, where the earth closets were 'under the management of the Local Board of Health'.

13 A cartoon in the *Otago Punch,* 6 October 1866, p 45, shows William Mason, the current mayor of Dunedin, carrying a miniaturised Moule closet - presumably because he was advocating its use in the city: reproduced in John Stacpoole, *William Mason* (Auckland 1971), p 95.

14 Waring, *Earth Closets,* pp 3, 15-16.

forgotten, for it was described as the 'French earth closet'.[15] By the 1880s G A Waring, the original apostle of the earth closet in the United States, had changed his view. He now saw a system which treated only faecal matter as less than adequate, and believed water to be a better medium than earth for the treatment of offensive substances, and less liable to destroy the beneficial properties of the waste as manure.[16]

Meanwhile, especially after the expiration of Moule's patent, other types appeared. In 1881 John Parker showed his 'Automatic Dry-Earth Closet' at the Sanitary Exhibition in South Kensington, London. This was reported in Australia,[17] and it is likely that such British sources were the inspiration for most of the local variations in the later part of the century.

Moule's closet in Australia

In 1864 the Melbourne merchant D S Campbell took out a local patent on what seems to have been Moule's system, 'the use of pulverized earth instead of water in closets and commodes'.[18] By 1866 Moule's closet was being sold in Melbourne by the Patent Earth Closet Company of 142 Spencer Street, at prices were from £4 upwards, and there were models which were self-acting and others which required the user to pull a lever. The company was also ready to contract for the supply of earth and the cleaning of the closets, and advertised the by-product for sale as 'the most fertilising of all known manures' at seventy shillings a ton.[19] It was the same material, no doubt, which it showed at the 1866-7 exhibition, calling it, as did Woodward, 'guano'.[20] In 1866 the government's Select Committee on Nightsoil recommended the use of the Patent Earth Closet Company's 'device',[21] and this is doubtless the reason why it was taken up so widely in government buildings.

Though the actual installations are documented only in public buildings, it is clear that the earth closet must have been in wide domestic use as well. The lunatic asylums at Beechworth and Ballarat were amongst the first in Victoria to have earth closets installed, and the Kew Asylum, though originally designed to have water closets, was altered to the new system. Earth closets were installed at the Melbourne Treasury as part of a program of work in 1868, and were accommodated in a shed at the rear of the building. There were six or more closets, a urinal, a further separate closet, and a large coal store or locker. Behind the closets was a closed passage

15 Jonathan Periam [adapted by R W E MacIvor], *The Pictorial Home and Farm Manual* (Sydney 1885), p 412.
16 G A Waring, *Sewerage and Land-Drainage* (New York 1889), p 365.
17 Waring, *Sewerage and Land-Drainage,* p 365.
18 Victorian patent application no 736, Daniel Stodhart Campbell, 1 August 1864..
19 Butler & Brookes, *National Directory of Victoria for 1866-67* [Melbourne 1866], advertisements no page.
20 Intercolonial Exhibition, Melbourne, 1866-7, *Official Record* [Melbourne 1867], p 386.
21 J L Bruce & T L Kendall, *Australian Sanitary Inspector's Text-Book* (Sydney 1901), quoted in Michael Cannon, *Life in the Cities* (West Melbourne 1978 [1975]), p 161.

giving access for maintenance.[22] By the 1870s the Alfred Hospital in Melbourne had installed earth closets, and the University of Melbourne, being harried by the local Board of Health, was forced to do the same.[23]

In the 1860s Moule's system was tried out at the Perth Hospital[24] - though it may or may not have been adopted. In 1867 the system was under discussion for the Fremantle Gaol, having regard to its reported success in various East Indian barracks. Experiments on the use of dry earth were successful, and in January 1868 it was proposed to proceed on the assumption that two tonnes of dry earth per day were needed for five hundred men, at a rate of 4 kg per man.[25] Very little is heard of Moule's closets in Sydney, though one was displayed at the 1870 Exhibition by J H Dunning.[26] However, it was an enquiry from New South Wales which stimulated the British Secretary of State for Colonies to send out to the various colonies detailed information on Moule's system,[27] stimulated initially by, and the Queensland Government published this material in Parliamentary Papers.

variant types

In Brisbane the open pan system had been universal, and despite the sub-tropical climate the Council required only that the pan be emptied once a week. In 1866 the Colonial Architect, Charles Tiffin, 'invented' an earth closet and tested it at Brisbane Hospital and the new Houses of Parliament, as well as delivering a paper to the Queensland Philosophical Society 'On the use of earth closets as a means of preventing the vitiation of the air'. 'Tiffin's new registered self-acting earth-closets' were now manufactured by the local cabinetmaker, John Cary,[28] but it is not at all clear whether Tiffin had really invented anything, as opposed to cashing in on Moule's device. In 1871 the British Secretary of State for Colonies sent out to the various colonies detailed information on Moule's system,[29] stimulated initially by an enquiry from New South Wales, and the Queensland Government published this material in Parliamentary Papers. In 1873 cesspits were outlawed in Brisbane, and the earth closet became the approved system.[30] It was now that A E Lewis, the

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22 [Delia Taylor], *Old Treasury Building, Spring Street, Melbourne: Conservation Analysis* (Historic Buildings Branch Consulting Services, Public Works Victoria, Melbourne 1987), pp 29, 34.

23 Reed & Barnes to the Vice Chancellor, Melbourne University, 10 June 1878, Central Registry file 1878/32, office no 566.

24 Information from Michal Bosworth , 1990, citing G Bolton & P Joske, *History of Royal Perth Hospital* (1982).

25 References supplied by Michal Bosworth from the data base on Fremantle Gaol. BL ACC1156 C47 (Comptroller General's Despatch Book, 1863-1894), PD 611: minute of 2 December 1867. BL ACC1156 C32 (Superintendent's Letterbook, 1865-1869), PD 543: 28 January 1868.

26 *The Industrial Progress of New South Wales* (Sydney 1871), p 125.

27 Lord Kimberley, Secretary of State for Colonies, to the Officer Administering the Government of Queensland *(Despatch Respecting) the Dry Earth System,* 11 August 1871.

28 Donald Watson & Judith McKay, *Queensland Architects of the 19th Century* (Brisbane 1994), p 113.

29 Lord Kimberley, Secretary of State for Colonies, to the Officer Administering the Government of Queensland *(Despatch Respecting) the Dry Earth System,* 11 August 1871.

30 Watson & McKay, *Queensland Architects,* p 192.

eccentric carpenter, joiner, building contractor, real estate agent and self-styled architect, became also an earth closet and nightsoil contractor in Brisbane.[31]

Next, Dr Hugh Bell took out a Queensland patent in 1878 for what was purportedly a totally new method of disposal, in which the problems of bulk and sloppiness were overcome by keeping urine and faeces separate at all stages. Under Bell's patent, young children used a special seat in which solid matter was caught by a colander while liquids passed through into a container. Under the adults' seat was a separate pan and urinal which could be readily used by men, but Bell was vague about women, whom he thought could 'more or less' learn to use it, though they should probably use the children's colander in case of mistakes. In Bell's system the urine was easily disposed of in the ground or run into the household drainage. For the faeces he recommended sprinkling with a spoon or two of household dust or ashes, and then selling the result as fertiliser at a farthing a pound. The only significant development on Moule's principle would seem to be the more complete attempt to separate urine, and the use of the colander.

Bell's system was further improved by Henry Jordan, who was the Registrar-General of Queensland, and also an amateur engineer. It was strongly recommended by the Queensland Central Board of Health, which stated in February 1879 that it was 'much the most perfect of the many [systems] which have been suggested,' and in 1880 the government published it in the form of a chart.[32] It was adopted in the Brisbane Telegraph Office, Finney Isles's drapery emporium and other large establishments.[33] Bell published *The Dry Closet System, after Nature,* in 1881.[34] In the Treasury Building, given Clark's familiarity with the general principle, and the fact that one of the principal tenants, the Registrar General, was an enthusiast, the use of the earth closet system must have been a foregone conclusion. One of the entrants in the design competition for the building recommended Moule's closets,[35] doubtless in ignorance of the locally developed alternative. When the building was constructed earth closets were duly installed, and these were presumably of the Bell variety, but the future conversion to reticulated sewerage was envisaged (rather optimistically, as it was not to occur until thirty years later):[36]

> The closets next back entrance to have a soil pipe, 4 inches diameter, of 10-lb. lead, fixed for future use, with proper junctions for each closet. The outlet to be into court-yard, and top to go through roof, with approved exhaust.

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31 Watson & McKay, *Queensland Architects,* p 113.

32 *Australian Engineering and Building News*, 1 May 1881, p 198.

33 Michael Cannon, *Life in the Cities* (West Melbourne 1978 [1975]), p 162.

34 Hugh Bell, *The Dry Closet System, after Nature, with Difficulties in Sewage Solved* (Brisbane 1881), reviewed in *Australian Engineering and Building News*, 1 May 1881, p 198. Also cited in Enid Barclay, 'Fevers and Stinks: some Problems of Public Health in the 1870s and 1880s', *Queensland Heritage,* II, 4 (May 1971), pp 8-9.

35 'Esperance: Description etc of Designs of proposed New Public Offices: Brisbane' [1883] (extract held by the Historic Buildings Branch, Brisbane), p 6.

36 *Specification of the Material and Works required in the erection of Public Offices, Brisbane ...* (contract signatures 27 April 1886), p 34.

The separation principle developed by Bell was to be further refined in Australia, and as described in 1901

> In some arrangements ... an effort is made to separate the liquid from the solid matter. This is sometimes done by providing a sort of shoot under the front part of the seat, whereby the greater part of the urine is conducted to a separate vessel containing absorbent material. At other times the pail is made with a perforated bottom, and placed over a receptacle also filled with absorbent material. This enables any excess moisture to drain away from the material, so enabling the remaining matter in the pail to be more thoroughly dried by the earth, so that a smaller quantity will produce the requisite effect.

It seems to have been the latter system that was used in the O'Brien closet, installed in New South Wales public schools in the late nineteenth century. A rival method, 'the dry catch system', was promoted by a Dr Poore and used no earth at all, nor any pail for the solids. The matter dropped onto a slightly sloping surface of an impervious material such as slate. The liquid drained away into a receptacle of absorbent matter. The solid dried rapidly and was removed at intervals with a shovel, by way of a small door at the back, and dug directly into a garden or other suitable place.[37]

Moule's original patent would have expired, in the normal course of events, in 1874, which makes it difficult to tell how much it was modified or improved by later patents. Thus in 1883 Mayes listed only 'Patent Paragon Earth Closets'; [38] McLean Bros & Rigg of Melbourne advertised Massey's Patent Earth Closet;[39] and in Sydney Neave & Co dealt in Heap & Co's patent inodorous closets and commodes.[40] Whether any of these differed substantially from Moule's it is impossible to say. Neave's closet was singled out by the *Australasian Builder & Contractor's News* for special praise, as it was 'absolutely self-acting, simple in construction, and contains nothing that can get out of working order'. A shower of earth would descend into the pan immediately after the closet was used, and the only attention required was to replace the earth twice a week. The Glebe Municipal Council had already approved it for use in the borough, and other local bodies were interested.[41]

There were a number of makers and contractors active in Melbourne other than Woodward and Campbell,[42] but amongst them the most prominent was Theophilus Draper & Son, who leased the East Collingwood Council's manure depot at Clifton Hill, and there completed the process of deodorizing the collected waste. Draper & Sons in 1878 submitted a quotation to Melbourne University of £45 a year to thrice weekly clean and supply with earth fourteen closets,[43] which had just been installed to

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37 J L Bruce & T M Kendall, *The Australian Sanitary Inspector's Text Book* (Sydney 1901), pp 266-7.

38 Charles Mayes, *The Australian Builders' Price-Book* (4th ed, Melbourne 1883), p 105.

39 Michael Cannon, *Life in the Cities* (West Melbourne 1978 (1975), p 161.

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

41 *Australasian Builder & Contractor's News,* 6 April 1889, p 334.

42 George H Stansby; Bailey & Robertson; James Brown; David Brown; W T McGill & Company; Alexander Fraser.

43 Copy kindly supplied by George Tibbits, from the Melbourne University Central Registry File 1878/32, 566.

replace the ten privies at the main building, and the four at the Medical School, previously served by cesspits.[44] Draper, like Woodward, had international aspirations, and displayed his patent earth closets and fittings at the Philadelphia Centennial Exhibition of 1876.[45] Subsequently Drapers were awarded a silver medal at the Melbourne International Exhibition of 1880-1,[46] and a gold medal at the Centennial Exhibition of 1888-9.[47]

One of Draper's patent closets survives at Glen Alpine Homestead near Werris Creek, New South Wales, complete with the original instructions which read as if it were to be serviced by the Melbourne Company, which can hardly have been the case. The closet cantilevers from the back of the house on a sort of built-in balcony, and dates from after 1889. This means that it cannot be original to the building, which is believed to date from 1886 and to have been designed by John Horbury Hunt, but Hunt is known to have visited the Centennial Exhibition, and this may be the reason for the device being taken up so far from home.[48] The instructions, as transcribed by Robert Irving, read:[49]

Prize Medal International Exhibition, Melbourne, 1880-81.
Gold Medal, 1st Order of Merit, with Special Mention, International Exhibition. Melbourne, 1888-89.
Prize Medal, International Exhibition, Adelaide, 1881.
NOTICE
TO USERS OF THIS CLOSET
In using the pull, lift it to the fullest extent and then DROP SUDDENLY. By doing this sufficient earth will flow to deposit in the receptacle.
PERSONS ARE CAUTIONED NOT TO USE THE PULL A SECOND TIME.
DRAPER & SONS, Patentees
G. DRAPER, Proprietor

NOTICE
SLOPS OR LIQUIDS
OF ANY DESCRIPTION
MUST NOT BE THROWN INTO THIS CLOSET
Neither must it be used as a common urinal as its efficiency will thereby be impaired and the cleaning of the closet may be discontinued at any moment.
DRAPER & SONS
PATENT EARTH CLOSET FACTORY, 38 BOURKE STREET WEST.

Over time, in Victoria at least, the more reputable and specialist contractors were undercut by cheaper competitors, the quality of service declined, and the earth closet

44 Reed & Barnes to the Vice Chancellor, Melbourne University, 10 June 1878, Central Registry file 1878/32, office no 566.
45 Victoria, *Official Catalogue* [Philadelphia Exhibition], p 99.
46 Melbourne International Exhibition, 1880-1881. *Official Record* (Melbourne 1882), p 435.
47 Centennial International Exhibition 1888-1889, *Official Record* (Melbourne 1890), pp 892, 894, 1084.
48 Peter Reynolds, *Horbury Hunt Housing the Horse and Shearing the Sheep* ([Sydney] 1992), pp 12-13. This material has been very kindly supplied by Robert Irving.
49 With format and capitalisation determined so far as practicable from Irving's slide.

gave way once more to the primitive pan.[50] Institutions, however, were probably the last strongholds of the system, for as late as 1886 the Federal Sanitary Company was formed in Melbourne to work the 'Domestic Dessicator', said to be especially adapted for hospital wards, sick chambers, public institutions and factories.[51] The specification for the Bairnsdale Court House, Victoria, of 1892, called for earth closets each with a drawer for the deodorant and with Rimu pine seats, except that of the judge which was to be of french polished cedar.[52]

the afterglow

In Western Australia Moule's closets were still being installed at railway stations as late as the 1890s,[53] but the Fremantle Gaol seems to have converted in 1902, along with the public buildings of the town, to a duplicate sanitary pan system using sawdust, in which the pan was removed three times a week and the waste incinerated.[54] On Rottnest Island earth closets were provided in the lighthouse keepers' quarters of 1895 and 1900, though very soon after this a deep sewerage disposal system was constructed (making the island ahead of Perth in sanitary terms).[55]

In England it appears that Morrell's patent ash closet (and perhaps others of the genre) were developed in the 1860s as an improvement on the earth closet,[56] and later developments included Gibson's patent earth closet and commode, and the 'cinder sifting ash closet' of the Sanitary and Economic Manure Company, Salford.[57] Dry earth and ash closets were still being made at the turn of the century by John Parker of Woodstock, near Oxford. He advertised them as 'the latest success', and claimed to be the inventor, but also claimed that his patent had 'been before the Public 40 years - which would make it almost contemporary with Moule's - while the business itself was said to have been founded in 1840.[58] It is unclear whether there was anything distinctive about Parker's closets, and there is nothing to suggest that they reached the colonies. Still later in the century the Adamses earth closet used in Britain was not significantly different from Moule's original system, except insofar as the earth hopper itself tilted automatically when pressure was removed from the seat, and the

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50 Miles Lewis & Best Overend & Partners, *Kew Lunatic Asylum* [2 vols, Melbourne 1988], I, pp 112-114.

51 *Australasian Ironmonger,* I, 7 (1 October 1886), p 159.

52 'Specification ... of New Court House at Bairnsdale', 19 December 1892.

53 Ingrid van Bremen, 'The New Architecture of the Gold Boom (PhD, University of Western Australia., 1990), p 154.

54 References supplied by Michal Bosworth from the data base on Fremantle Gaol. BL ACC968/1304 CSO doc, PD 1320.

55 R J Fergusson, *Rottnest Island: History and Architecture* (Nedlands [Western Australia] 1986), pp 69, 71, 75.

56 Wyatt Papworth [ed], *The Dictionary of Architecture* (London 1853-92), sv Privy, cites a description of an ash closet (unspecified) in the *Building News,* XIV (1869), pp 41-2.

57 Papworth, *Dictionary of Architecture,* sv Privy.

58 J E Sears [ed], *The Contractors,' Merchants,' and Estate Managers' Compendium and Catalogue* (15th ed, London 1901), p 254.

earth was discharged by this means.[59] This sounds comparable to the American system referred to above.

In Australia later earth closets included Neave's (or Heap's), as already mentioned, and the 'Simplex', sold by T Headen & Sons of Melbourne. The Simplex was another variety claimed to be so straightforward that it could not get out of order, and was shown at the Centennial Exhibition in 1888-9.[60] Another closet was shown by T Grace of Forest Lodge, Sydney,[61] but it is unclear whether it was in commercial production. Others were exhibited by G Draper - presumably a connection of Theophilus Draper - A Fraser, and S N Sutton, all of Melbourne.[62] There were later patent models advertised in Australia, such as the 'patent automatic dry earth closet' (available in stained pine) which Mayes listed in 1908.[63] In the 1920s the K.L.O. Patent Sanitary Seat, a Melbourne invention which automatically sprinkled 'Odorless Sanitary Powder' at every use, was installed in all State Bank houses in unsewered areas of Victoria.[64]

These dry systems differed from overseas closets which used liquid, like the Windsor Indoor Chemical Closet marketed in the United States by Montgomery Ward. This was to be emptied regularly, typically at two week intervals, and a liquid chemical diluted in two gallons [9 l] of water put in to disinfect and deodorise it. The pan was contained within a larger container which had its own vent pipe to the external air, and was closed by a lid when not in use.[65] Closets of a similar nature were to be found in rural Australia into the 1950s.

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59 A C Martin & J C Henwood, *The Modern Practical Plumber* (3 vols, London, no date), III, pp 12-13.

60 *Australasian Builder & Contractor's News,* 27 April 1889, p 405; Centennial International Exhibition 1888-1889, *Official Record* (Melbourne 1890), p 629.

61 Centennial Exhibition, *Official Record ,* p 510.

62 Centennial Exhibition, *Official Record ,* pp 628-9. There was also 'Hunter's patent disinfecting closet', shown by S Lowe of Melbourne, but it is not clear whether this was an earth closet.

63 C E Mayes, *The Australian Builders and Contractors' Price-Book* (7th ed, Sydney 1908), p 174.

64 *Australian Home Builder,* 15 April 1925, p 18.

65 Montgomery Ward & Co, *Economy in Plumbing and Heating* (Chicago, no date, c 1925), p 45.