9.09 Mechanical

a. bells
b. speaking tubes
c. vacuum tubes & cash systems
d. early lifts
e. passenger lifts
f. the hydraulic power system
g. electric lifts & escalators

a. bells

The earliest mechanical services in Australia, servants' bells and front door bells, are of little concern to us here because, so far as we know, they conformed totally to British practice, and British texts are available as references. Suffice to say that they existed from an early date - for example, Ellis Bent's widow was trying to sell her bell ropes and handles in 1816,[1] and in 1817 bells were being hung at Government House, Parramatta.[2] Even in Britain, bell-hanging seems to have begun only in the eighteenth century, and the bells were operated by ribands or strings hanging from the ceiling, until around 1830 when a wall fitting was devised with a knob which was pulled to activate the bell.[3] This seems to have been the form of bell used still at 'Lyndhurst', Sydney, where Richard Barlow, bellhanger and locksmith, is said to have drilled holes in the ceilings and attached the wires early in 1836, while later in the year George Wagg, black and white smith, fixerd the pulls at one end and the bells at the other.[4]

Wires taken down through the walls and worked by handles followed soon afterwards. The lever handle was rotated to pull on the wire, which might be guided through a tin funnel or cone, so as to minimise friction, into a pipe or conduit running up behind the plaster surface to the roof space or the space between floors. There it would have to change direction, which was done by tying the wire to one arm of a rocking crank, while another wire attached to other arm went off in the new direction, usually at right angles. There might be further changes of direction until another crank took the wire vertically down to the bellboard. Upon this a number of balls hung in a row, and their different tones would indicate the room from which the summons came.

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1 '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.

2 James Broadbent, *The Australian Colonial House* (Sydney 1997), p 63.

3 J C Loudon, *An Encyclopaedia of Cottage, Farm and Villa Architecture* (London 1846 [1833]), § 590, p 282.

4 Barrie Dyster, *Servant and Master* (Kensington [New South Wales] 1989), p 107.

The bellboard (indicator, indicator box) which displayed the number of the room requiring service was not invented until about 1848, and was then in dispute between a number of putative inventors in the United States.[5] At the Great Exhibition of 1851 Joseph Burdett showed a version of the 'domestic telegraph', which required only one bell, because the room from which the signal came would be indicated on a dial at the receiving end.[6] More sophisticated was Bryden & Sons' 'index dial bell' which could be made to ring at different destinations by turning a dial.[7] This was not so much applicable to domestic use as to commercial and industrial installations, where it might be necessary to summon clerks or hands from different locations.

The local manufacture of bell components probably began in 1835, when Robert Russell of Hobart advertised:[8]

> Bells hung in the most substantial manner, every article almost being of my own manufacture, and intended to be strong, together with nearly 30 years experience in that line.

A Melbourne tradesman in 1854 went so far as to advertise 'Bell hanging in the real English style.'[9]

Electric bells operated by batteries came into use in the 1870s, well before electric lighting and other appliances, and once again practice seems to have derived entirely from Britain. There they were available by the 1860s in the form of a 'trembling bell' in a mahogany or oak case, together with an indicator box for either six or ten bells, in a box of polished mahogany or cherry. They might be served by an improved Daniell battery or a Marie Davy battery.[10] There was also Bregnet's system, said to be universally adopted for new buildings in Paris, which had a small dial to show when the bell was ringing.[11]

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5 Wyatt Papworth [ed], *The Dictionary of Architecture* (London 1853-1892), sv Bell-Hanging.

6 London, Great Exhibition of the Works of Industry of all Nations, 1851, *Official Descriptive and Illustrated Catalogue* (3 vols, London 1851), I, p 455.

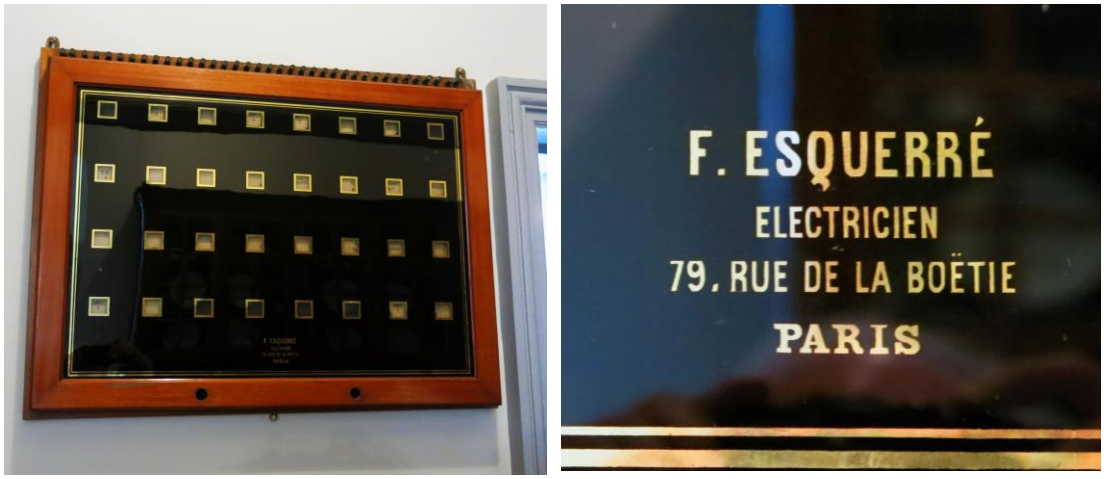
7 London, Great Exhibition, 1851, *Catalogue,* II, p 597.

8 Hobart Town Foundry and Smithery, advertising flier, c 1835, Allport Library, Hobart, reproduced in Brian Turner, *Australia's Iron Lace* (Sydney 1985), p 37.

9 *Argus,* 27 January 1854, p 10.

10 G R Burnell [reviser], *The Builder's and Contractor's Price- Book for 1863* (London 1863), pp 211-212.

11 Burnell, *The Builder's and Contractor's Price- Book for 1863,* advertisements.



Electric bellboard at the Chateau of Champs-de-Marnr, near Paris. Miles Lewis.

Towards the turn of the century there were three basic types of indicator. In the mechanical replacement indicator a sliding rod, with a handle at the side of the case, was moved to remove or conceal the displayed number. In the electrical indicator a reverse current could be used to reset the display, if necessary from a considerable distance, but it was less reliable. In the pendulum indicator a pendulum was set swinging by the action of ringing the bell, and the display remained only so long as the pendulum was in motion, usually sixty to eighty seconds.[12] A British specification of 1898 is probably as good guide as any to practice in Australia. The wires were to be no. 20 tinned copper wire covered in pure india rubber, then double cottoned and paraffined. All those leading from the positive pole of the battery were to have a red covering, and those from the negative a black one. They were to run through zinc tubes, be fixed with only insulated staples (if any), and run to bell pushes with unscrewable tops, large ivory plungers, ebonite backs, and platinum pointed springs.[13]

Government House, Melbourne, of 1872-6, was equipped with electric bells, and the present bell pushes in the rooms, which may be original, are unusual in that each is separately inscribed on the annular surround - thus, in the private dining room, on either side of the fireplace, there are bells for the butler's pantry and the servants' hall, whilst next to the doorway there is another bell for the kitchen. In the Governor's office there are no less than six bells for purposes such as summoning aides. Other early electric bells were those installed in every room at 'Rupertswood', Sunbury, in 1874-6,[14] and in many at 'Mintaro', Moneggeetta, of 1883-4, where Hyde's bellboard survives,[15] Thomas Cooper Hyde emigrated from England and established himself in 1873 as the first electric bell manufacturer, at his Victoria Electric

12 P N Hasluck, *Electric Bells* (Melbourne, no date [c 1900]), pp 142-4.
13 PF R Farrow *Specifications for Building Works and How to Write Them* (London 1898), p 92.
14 *Weekly Times,* 4 March 1876, p 2.
15 Inspected, various occasions.

Works in the Melbourne suburb of Richmond.[16] He is likely to have been responsible for these early examples, and certainly was for those at 'Mintaro', Monegeetta, of 1880, and 'Carranballac', near Skipton, where the bell boards bear his name.

By 1883 electric bells were a standard item in Mayes's price book.[17] In 1884 a house for sale in Melbourne was advertised as having all the latest improvements, including hollow walls, electric bells, and speaking tubes.[18] In 1887 it was reported that Clement and Boyle of Oxford Street, Paddington, Sydney, had made some improvements in electric bells, and had developed a new apparatus by which, when the knocker was used at the front door, a bell automatically rang in the kitchen.[19] It is not clear why this was thought better than simply having a bell push at the front door. In 1888-9 Hyde's firm, now T C Hyde & Co of the Victoria Electric Works, Richmond, Melbourne, displayed electric bells, indicators and alarms at the Centennial Exhibition, but there was now competition, for F H Moody of St Kilda also showed electric bells and indicators.[20] Others soon followed.[21]

At the house 'Warra', 53 Murdoch St, Wangaratta, Victoria, of 1908, the batteries which operated the service bells survive in a cellar space. The earliest were glass jars, doubtless of the Leclanché type, but they had been succeeded by what are described as 'cylindrical tar filled batteries'.[22]

b. speaking tubes

Speaking tubes were in use in Britain by the early nineteenth century,[23] and the best known was the Telekouphonon, or speaking telegraph, invented by Francis Wishaw of London. It was a tube of gutta percha or other material through which one could speak to somebody at a distance, after attracting their attention with a whistle or other device. It was shown at the Great Exhibition of 1851,[24] and by 1853 was known as Wishaw's Registered Improved Telekouphonon, manufactured by Kepp and Company,[25] and later

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16 Alexander Sutherland [ed], *Victoria and its Metropolis* (2 vols, Melbourne 1888), II, p 607.

17 Charles Mayes, *The Australian Builders' Price-Book* (4th ed, Melbourne 1883), p 112.

18 *Argus,* 19 April 1884, p 2. The house was in Kensington Road, South Yarra, and it was sold under the instructions of the architect Edmund Ovey, who was possibly both its owner and its designer.

19 *Australasian Builder & Contractor's News,* 14 May 1887, p 5.

20 Centennial International Exhibition 1888-1889, *Official Record* (Melbourne 1890), p 620.

21 In Melbourne there were J Newton & Co of Bourke St, whose brand appears on the bellboard at 'Purrumbete', Camperdown, western Victoria, of 1901, and Edmiston & O'Neill of 464 Collins Street, whose board at nearby 'Wiridgil' probably dates from the renovations of 1902.

22 Information from Deborah Kemp., January 2014, coming ultimately from Guy Robertson..

23 Loudon, *Cottage, Farm and Villa Architecture,* §1473, p 703.

24 London, Great Exhibition of the Works of Industry of all Nations, 1851, *Official Descriptive and Illustrated Catalogue* (3 vols, London 1851), I, pp 454-5.

25 *Builder* (UK), XI, 513 (2 July 1863), p 431e.

by Benhams & Froud of London,[26] though there were rivals, such as J H Heeps.[27] Wishaw's had a flexible tube covered in maroon, green or blue worsted, and available as options a mouthpiece with indicators, in iron, cocus wood, or lacquered, bronzed or tinned brass.[28]

Speaking tubes seem to have reached Australia within about a decade, and the first to be recorded are those of Benjamin Batchelder's photographic studio at Bendigo, completed in 1864.[29] Immediately after this, in December 1864, Horbury Hunt's proposed additions to the Union Bank in Sydney included a lift with a speaking tube.[30] Early in 1865 tubes are shown on drawings for the Australian Insurance Company offices in Melbourne, extending from the public area to the upstairs boardroom, actuary's office, and other parts of the building.[31] Other speaking tubes, which may be original, actually survive at the Melbourne mansion 'Rippon Lea' of 1868. The board in the basement kitchen seems to indicate that tubes ran from there to service rooms and the landing - that is, they were there to coordinate the movement of the servants rather than for communication with the gentry - and in a large house on three levels the need for them is understandable. Tubes also survive at the house 'Blackwood', in western Victoria, of 1891-2.

Speaking tube triumpet at 'Mintaro',Moneggeetta: Miles Lewis.

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26 F W Laxton, *Laxton's Builder's Price Book for 1863* (London 1863), advertisements, no page.

27 John Henry Heeps of London won a medal at the 1862 Exhibition for his gutta percha hearing apparatus for the deaf, for use in churches and chapels, and he manufactured speaking tubes, gutta percha and ivory mouthpieces, and gutta percha and ivory whistles: Laxton, *Price Book for 1863*, advertisements, no page.

28 G R Burnell [reviser] *The Builder's and Contractor's Price-Book for 1865* (London 1865), p 133 & advertisements.

29 Mike Butcher & Y M J Collins, *An American on the Goldfields: the Bendigo Photographs of Benjamin Pierce Batchelder* (Strathdale [Victoria] 2001), pp 4-5.

30 Peter Reynolds & Joy Hughes, 'The Blacket Years: Works 1863-1869', in Peter Reynolds, Lesley Muir & Joy Hughes [eds], *John Horbury Hunt: Radical Architect 1838-1904* (no place [Sydney] 2002), p 40.

31 [Austin & Ellis], 'Australian Insurance Compy Offices Collins Street West' (Melbourne 1865), p 87.

T C Hyde, the electric bell pioneer, also dealt in speaking tubes,[32] and as he installed the electric bells at 'Mintaro' we can assume that he was also responsible for the speaking tubes, of which there are two, one from the dining room and one fromthe upstairs landing, both leading to the kitchen, ,[33] and likewise for those at 'Mintaro'. In 1876 speaking tubes were installed at the Hotham Town Hall,. Melbourne, though by whom is not apparent.[34] In about 1880 speaking tubes were installed at 'Martindale Hall', South Australia,[35] though of which make is again unknown. The Melbourne architect Edmund Ovey probably installed them in his own house at least as early as this, and they are referred to in a sale advertisement of 1884.[36]

In 1891 the house 'Benvenuta' in Melbourne was provided with a speaking tube, using the usual composition pipe, from the main bedroom to the servants' room and kitchen. In addition, however, there was a much less conventional tube consisting of a two inch [50 mm] cast iron pipe, leading from the strong room. Although it was said to be for ventilation, which is not normally a pressing need in a strongroom, it was formed into a trumpet shape at either end, and the outlet was in a wardrobe in one of the upstairs bedrooms.[37] It seems to have been intended either to communicate with somebody who had taken refuge in the strongroom, and/or to eavesdrop upon any officials who might be inspecting its contents, for the Abrahams family, who owned the house, were involved in distinctly shady activities. The house built for Leah Abrahams, whose husband killed himself in the hall shortly after it was completed, and in 1895 their four sons were all convicted of conspiracy to defraud, and sentenced to four months hard labour.[38] Another indication of concern about the strongroom was the provision of a bell which was linked to its door and rang at the rear of the house, presumably when it was opened.[39]

In general, however, speaking tubes were confined to commercial and public uses. In 1887 it was said of the new Public Offices in Brisbane that:[40]

> Electric Bells and Speaking Tubes will thoroughly intercommunicate between the upper and Lower Rooms of Departments, whilst telephonic connections will be placed in Each Department on each Floor - thus avoiding a great deal of moving about ...

In Adelaide Martin's drapery store, completed to the design of Withal & Wells in 1889, incorporated prismatic pavement lights, speaking tubes, lifts and

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32 Sutherland, *Victoria and its Metropolis,* II, p 607.
33 *Weekly Times,* 4 March 1876, p 2.
34 Bill Hannan, *Pride of Hotham* (North Melbourne 2006), p 87.
35 Elizabeth Warburton, *Martindale Hall* (Adelaide 1979), p 80.
36 *Argus,* 19 April 1884, p 2.
37 W S Law, 'Specifications of Residence Drummond St. Carlton for Mrs. L. Abrahams' (Melbourne 1891), pp 35-6.
38 Michael Cannon, *Land Boom and Bust* (Melbourne 1972), p 15.
39 Law, 'Specifications for Mrs. L. Abrahams', p 35.
40 'New Public Offices: Brisbane: Report accompanying plans Bearing Motto', 20 November 1882 (held by the Historic Buildings Branch, Brisbane), p 6.

electric light.[41] The Australian Property & Investment Co Building in Melbourne, of 1889, had 'speaking tubes extending from the ground floor lobby to the offices in the eleven storeys above,[42] and in Sydney speaking tubes were installed in Wertheim's Building to link each office to the 'tablet board' in the entrance.[43]

c. vacuum tubes & cash systems

Reticulated vacuum cleaning services were introduced by the engineer George Vincent, of Melbourne and Sydney, at some time about 1913, when they were installed in the Commercial Travellers Club in Flinders Street, Melbourne, and the adjoining 'Commerce House; in Adelaide at the Wondergraph Theatre; and in Sydney at the Birt Ltd shipping offices and the Bank of North Queensland.[44] Another such system - whether by Vincent or not - was installed in 1915-18 in A1 Block of the Victoria Barracks, Melbourne. 'Ruthven Mansions', the first significant block of flats in Adelaide, is reported to have had 'built-in vacuum cleaners',[45] but this system perhaps dates from the extension of 1920 rather than the original building campaign of 19!0-12.

'Pneumatic telegraphy', or the transport of documents by pneumatic tube, had been in use since the 1850s when Latimer Clark installed a system in London, but it was only effective over short distances because of loss of power. In about 1875 the Frenchman, A Crespin, proposed a pneumatic connection between Paris and Versailles with a system of vacuum and pressure reservoirs which would maintain the pressure over any required length.[46] This would seem to have been the state of the art in 1888 when it was reported that 'pneumatic communication' for the transmission of letters and parcels was to be introduced between the Melbourne General Post Office and the suburbs.[47] The report was exaggerated. At the suggestion of George Meudell, and inspired by Berlin's *rohrpost* system the Postmaster General, F T Derham, had authorised a more limited proposal.[48] It was for letters and telegrams, but not parcels, and the first connection was only between the GPO and the Stock Exchange. A contract was signed in June 1892, with pneumatic tubes supplied by Alfred McKenzie, and the system was not operative until 1893, by which time Sydney had initiated its own. It was extended to Spencer Street and to the Rialto building in 1900, and subsequently to the newspaper offices.[49]

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41 'Zetetic', *Descriptive Australia* (Adelaide 1889), pp 131-3.
42 *Australasian Builder & Contractor's News,* 20 April 1889, p 339.
43 *Australasian Builder & Contractor's News,* 7 December 1889, p 535.
44 *The Architectural Students Annual* (Melbourne 1913), p xxvii.
45 Caroline Butler-Bowdon & Charles Pickett, *Homes in the Sky* (Carlton [Victoria] 2007), p 50.
46 Elton Engineering Books, *Catalogue Number 13* (London 1998), p 115, notes to A Crespin, *La Poste Atmosphérique* (Paris, no date [c 1875]).
47 *Australasian Builder & Contractor's News,* 15 December 1888, p 538.
48 Michael Cannon, *Land Boom and Bust* (Melbourne 1972), p 69.
49 Information from John Waghorn, 1997.

Pneumatic cash transfer systems in retail stores had a higher profile and a wider geographical distribution, though they were rivalled by the even more conspicuous overhead wire system, or 'cash railway'. The Bostedo Pneumatic tube system for the transfer of cash was developed in Chicago, and its success was guaranteed when the Marshall Field department store adopted it in 1893.[50] In 1898 the Melbourne drapers Craig, Williamson & Thomas invited the public to inspect the Bostedo system inslalled at their premises, claimed to be the only one in the Australian colonies.[51] But their lead was not followed. George Lekakis hastablishedthat the Bostedo comp[any was avcquired by LKason Paragonm, the makers of cash railways.

As both the cash railway and the pneumatic system were now marketed by the Lamson company, they did not compete in any commercial sense, but before either of these the company had marketed a more primitive and more literally railway-like system. Two examples survive in New South Wales, one at Lockhart and one at Coolamon, where it is thought to be contemporary with the store in which it is installed, dating from 1909. In this system the cash was transported in wooden balls which were hoisted upwards at the cashier's booth and then rolled down a sloping track formed of two parallel wooden rails. Above this track was the return track sloping in the other direction from the counter to the cashier. Each track served two counters, and the traffic for each was distinguished by using balls of different diameters.[52] We may surmise that the 'Detroit Cash railway ' which was operating in a Melbourne store from 1908[53] was something of a similar character.

Although the overhead wire and the pneumatic tube systems followed, it is not clear which was first. The wire system had a precedent of sorts, in that French utopian Charles Fourier proposed a labour exchange in each 'phalanx' of his ideal community in which communication took place by the movement of wires,[54] though it appears that this was all it meant - that is, the wires were not used to convey actual documents. There seem to have been no firms other than Lamsons supplying either system in Australia, notwithstanding that in Britain Lamsons competed with the Sturtevant Engineering Company.[55] The drapery of Dimelow & Gaylard in the Melbourne suburb of Richmond was rebuilt in 1906-7, after a fire, with 'the latest pneumatic cash tubes' throughout, for the most part concealed in the walls, at a cost of £400.[56] The nearby M Ball & Company drapery is a useful later example, because schemes were obtained from the Lamson Company for both the wire an the pneumatic systems. Having entered a hire purchase agreement for a cash

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50 *Daily Inter-Ocean News,* 16 October 1893, kindly provided by George Lekakis.

51 *Argus,* 5 October 1898, p 1, drawn to my attention by George Lekakis.

52 Information, 1999, from Dr Mike Pearson, who has obtained the blueprints for such a system from the Lamson company in England.

53 At Hooper's Store, Brunswick: *Footscray Advertiser,* March 1908.

54 John Carey, *The Faber Book of Utopias* (London 1999), p 211, citing the writings of Charles Fourier.

55 J E Sears & J E Sears [eds], *The Architects' Compendium and Annual Catalogue* (London 1936), pp 515-6.

56 *Richmond Guardian,* 16 March 1907, kindly provided by Sam Furphy.

railway with the Lamson Store Service Co on 23 September 1936, they may have had second thoughts. Lamsons prepared a drawing for a pneumatic tube system which is dated two days later, though it was the cash railway which actually proceeded.[57]

At Ball's the two systems were basically the same in plan, each with a central desk, a cashier's station, and two ordinary stations. The cash railway passed overhead in direct lines, whereas the pneumatic tubes had to be accommodated to the plan, and went in pairs along straight lines and curved corners. They were of 2¼ inch [57 mm] diameter, powered from a plant to be installed in the basement. The cash railway at Balls operated from 1936 to 1985, and not long afterwards was relocated to a nearby store, Dimmeys, more or less as a museum piece. As at 1987 there were a few other cash railways surviving in Victoria and one at Charters Towers, Queensland. The only known surviving pneumatic cash transfer system is one of about 1940 at the Beehive Store, Bendigo.[58]

The wire ceased had ceased to be installed by World War II, but the pneumatic tube system continued.[59] In 1950 Lamsons in Britain were still marketing the pneumatic tube system, but not the overhead wires.[60] At around this time there appeared the 'Pneu-Air Teminal', consisting of a metal box with glazed airtight doors, into which the cash carriers were delivered at the despatch station.[61] An 'automatic document distributor' was also introduced, in which overhead tracks carried specially formed trays, into which anything from a single document to a whole bundle could be clipped, without special folding.[6263] In 1959 a new wing was completed at the Royal Alexandra Hospital, Sydney, in which a 'pneumatic tube messenger system' was installed, the first in Australia to use tubes of rectangular section., 7 x 4 inches [178 102 mm].[64] The differences suggest that this was probably not a Lamson system. In about 1961 a small number of conveyor tubes were installed in the new Transport Commission building, Hobart, and as they were referred to as 'Carrier Air Tubes'[65] it seems probable that they were supplied by the Carrier air conditioning company.

d. early lifts

Early forms of lift had been developed for use in mines in Britain, and the main technical issue was not how to make them go up and down, but how to

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57 Inspected 1987.
58 Miles Lewis, 'Balls Store, Richmond' (typescript report 1987), passim.
59 Bryan & Norman Westwood, *The Modern Shop* (London 1952), pp 41-2.
60 Evelyn Drury et al [eds], *Architects', Builders' and Civil Engineers' Reference Book* (London 1950), pp 737-9.
61 Westwood, *The Modern Shop,* p 134.
62 Drury, *Architects' Reference Book* [1950], pp 737-9.
63 Miles Lewis, 'Balls Store, Richmond' (typescript report 1987), passim.
64 *Cross*-Section*,* no 78 (1 April 1959), p 3.
65 District Architect to Chief Architect, Public Works Department, Tasmania, 30 August 1963, Appendix A: Archives of Tasmania.

stop the rope breaking and the passengers being killed. Some of the earliest safety lifts for mines were Jones's Ascending and Descending Machine,[66] Fourdrinier's Patent Safety Apparatus for ascending and descending mines,[67] and W G Begg's Safety Cage, of 1851.[68] It was Begg's cage which first achieved a safety mechanism that was effective as well as practicable, and it was similar to the systems which continued to be used in Australian mine shafts into the twentieth century. However there was a wide range of goods lifts and dumb waiters, usually slow and often powered only by hand, before the passenger lift came into general use. Dodfman & Bellhouse of Manchester made a safety hoist which did not rely upon a spring. On either side of the cage were eccentrically mounted rollers which, when the tensioin was released, turned so that their long radii were against the guides at the sides, and thus jammed the lift in placed.[69] A 'wedge safety lift' sounds as if it may have been rather similar. In Adelaide in 1879 Bickford's warehouse had the first N A Davis patent wedge safety warehouse lift - 'an admirable arrangement, working noiselessly and easily by hand-power up to a ton'.[70]

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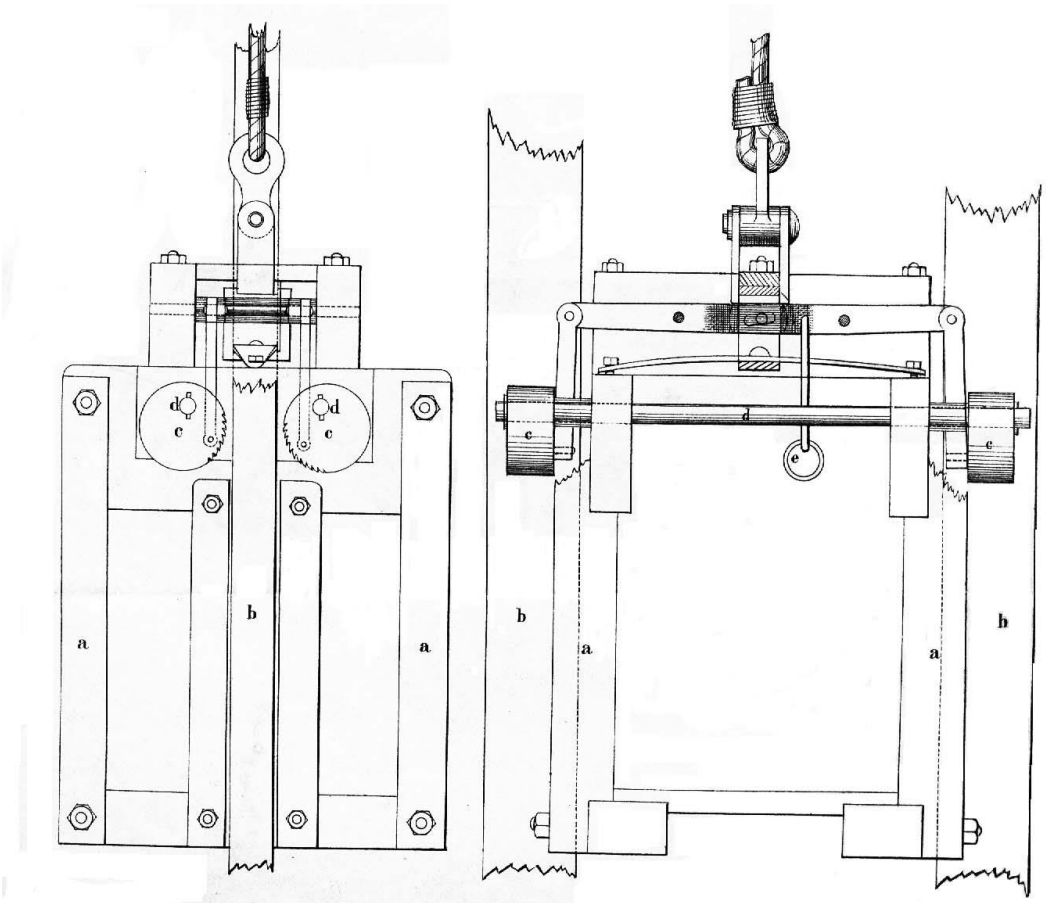
66 *Mechanic's Magazine,* XXIX, 789 (22 September 1838), pp 433-4. This operated on an extraordinary stop-go mechanism, whether rising or falling. It is not necessary to further describe it here, but there is interesting evidence that this unlikely device, or something resembling it, was installed in 1848 in a 60 m deep coal mine at Somain: Wyatt Papworth [ed], *The Dictionary of Architecture* (London 1853-1892), sv Lift.

67 *Illustrated* Exhibitor*,* 19 July 1851, p 121; London, Great Exhibition, 1851, *Catalogue,* I, p 227.

68 *Illustrated Exhibitor,* 6 September 1851, p 240; London, Great Exhibition, 1851, *Catalogue,* I, p 227.

69 *Dodman & Bellhouse's Safety Hoist* [leaflet], Dodman & Bellhouse, Manchester [1861]. The text is by George Dodman, probably the inverntor. His partner was almost certainly E T Bellhouse or some other of the family of leading Manchester milwrights and engineers..

70 *South Australian Register,* 9 August 1879, supplement p 5.



Dodman & Berllhouses cage: *Dodman & Bellhouse's Safety Hoist* [leaflet], Dodman & Bellhouse, Manchester [1861].

The American Elisha Graves Otis claimed to have invented 'The World's first safe passenger elevator' in 1853, but this had a notched rack and a spring which operated when the cable was broken, just as in Begg's Safety cage. In fact it was not a new invention at all, but another example of Yankee blowing. The real American contribution was the promotion and development of these systems as passenger lifts in commercial buildings, and that depended upon the development of reliable and reasonably speedy lifting machinery. Otises at first powered their lifts by belts from a shaft turned by a steam engine, then they changed to having an independent steam engine in the base of the shaft. Finally they adopted hydraulic power.[71]

Hydraulic power was quite widely used in Australia for wool presses, and it was not long before it was adapted to the operation of slow-moving hoists in woolstores, and in due course in other commercial premises. As early as 1859 hydraulic goods lifts were advertised in Melbourne by the English firm of Clark & Co.[72] In 1860 Edward Henderson, a former employee of the leading British hydraulic engineer, Sir William George Armstrong, was reported to

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71 Victoria. *Report from the Select Committee of the Legislative Assembly upon the Hydraulic System Bill* (Melbourne 1887).

72 ?Mayes 1859 - check.

have fitted a hydraulic hoist from the kitchen to the dining room of the Melbourne Club, and other hoists had been installed in the warehouses of Grice, Sumner & Co, Richard Goldsborough & Co, Captain George Ward Cole, and Goodman & Co.[73]

In 1861 the Melbourne engineer A K Smith exhibited a 'self-acting water lift' of his own invention, design and manufacture.[74] The hydraulic hoist serving the basement of the Melbourne Club was a failure - it is thought due to inadequate water pressure - and was replaced with a mechanically powered one.[75] Much the same happened with the hydraulic lifts were installed in 1865 in the Melbourne warehouse of L Stevenson & Sons, which was described as the first tall building in Melbourne. The two lifts were said to be 'very unsatisfactory', and one had to be entirely replaced. They ran on 'Yan Yean pressure' (that is the ordinary mains pressure from the Yan Yean Reservoir) and sometimes scarcely worked at all.[76] These were presumably low pressure goods lifts of the type which used ordinary water pressure to fill the cylinder, and allowed the water to drain away when the lift descended. This type of lift was unusable for about fifteen or twenty days of a normal year, when Melbourne's water pressure was too low.[77] The wastage of water by the lifts must haved ben equally apparent. In 1878 the new warehouse of Briscoe & Co in Collins Street, Melbourne was equipped with 'a commodious lift ... operated by means of Yan Yean water', and it was reported, somewhat defensively, tat that 'Owners of premises in business centres, though they consume very little water, are heavily rated by the Yan Yean department, and it is chiefly by means of lifts that they utilise the commodity which costs them so much.'[78]

Burnetts of London were advertising a wide range of products, including lifts, in Mayes's price book of 1862,[79] and in 1870 a Burnett lift was installed in the warehouse of S Hoffnung & Co, Sydney, designed by Thomas Rowe, though whether it was hydraulically operated is unclear.[80] In the 1870s lifts were used in the six-storey brewing tower of the Yorkshire Brewery and the seven-storey tower of the Victoria Brewery, both in the Melbourne suburb of Collingwood. The local smith and engineer Peter Johns began to make hydraulic wool presses and lifts in the 1870s. His first lift was constructed in 1874,[81] and one of his earlier installations was for Allan's Music Warehouse in 1877, and was of the old low pressure type. Shortly afterwards Johns took a major contract for lifts and hydraulic wool presses at Goldsborough's wool store in Bourke Street, and here they used a gas engine and accumulators to build up

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73 *Colonial Mining Journal,* II, 6 (February 1860), p 100.
74 Victorian Exhibition 1861, *Catalogue with Prefatory Essays* (Melbourne 1861), p 47.
75 Allom Lovell & Associates Pty Ltd, *Melbourne Club 26 Collins Street Melbourne Conservation Management Plan* (Melbourne 1998), p 77.
76 *Select Committee on the Hydraulic System Bill,* pp 20-21.
77 Geoffrey Blainey, *Johns and Waygood Limited 1856-1956* (Melbourne 1956), p 11.
78 *Argus,* 8 July 1878, p 6.
79 C B Mayes, *The Australian Builders' Price-Book* (2nd ed, Melbourne 1862), p 150.
80 H M Franklyn, *A Glance at Australia in 1880* (Melbourne 1881), p 353.
81 *Select Committee on the Hydraulic System Bill,* p 18.

pressure.[82] The stores built for D & J Fowler at Port Adelaide in 1880 had five hydraulic lifts for loading and unloading purposes, disposed along the length of their branch railway line, as well as hydraulic hoists within the building.[83] By 1881 the Melbourne firm of Hughes, Pye & Rigby were installing goods lifts supported by a single chain, and with only crude safety gear,[84] presumably powered by indirect hydraulic action. The Hon S A Stephens's house in O'Connell Street, Sydney, had an Otis lift in 1888, powered by an 'Otto silent gas engine housed in a yard behind the building.[85]

The hydraulic column or direct action lift, invented in 1876 by the Frenchman Leo Edoux, had the cage supported directly on top of a plunger or piston which sank into a cylindrical well in the ground, the depth of which had to equal the distance through which the lift was to rise. Water was admitted to the well, causing the lift to rise by hydraulic pressure, and then water was drained to allow it to fall.[86] The idea reached Australia quickly, for by 1880 Sydney softgoods and general merchants, Young & Lark, had four hydraulic lifts in their building, each with a capacity of fifteen hundredweight [0.75 tonne]. They were worked by steam power and were apparently on the direct action principle, as it was reported that a 17 metre shaft had to be sunk through the hard rock beneath.[87]

It was reported in 1887 that the engineer G S Duncan had invented the Automatic Hydraulic Governor, which offered two major benefits. It prevented the waste of piewer in those lufts which operated off the hydraulic mains, and were supplied with pressurised water proportional to their maximum carrying capacity, even when they were in fact lightly loaded. It also ensured that lifts correctly worked off the mains pressure supply without having to have their cylinders altered.[88]

Another local development sounds rather similar. The 'Lawrence Patent Hydraulic Power Machine' could be used for a variety of purposes, but as applied to lifts required 'no engine, machinery, pumps, ram well or accumulators'. It appears to have been an indirect hydraulic apparatus running off mains pressure. Lawrence's main innovation seems to have been that the supply of water to the cylinder was adjusted according to the load to be carried, thus reducing the amount of water wasted. Another major advantage was that the apparatus could be installed vertically, horizontally, or even at an angle, according to the constraints of the building design. The inventor had seven years of experience installing lifts in Sydney, and when his device was reported late in 1888 there were already several months of orders in hand at the Phillip Stephan Company's factory in Clarence Street,

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82 Blainey, *Johns and Waygood,* p 11.
83 Franklyn, *A Glance at Australia, in 1880,* p 384.
84 M J Taylor, 'Marvellous Melbourne's Sky-Scrapers' (2 vols, BArch, Melbourne University 1972), pp 8, 18, ref *Australasian Builder & Contractor's News,* 2 May 1891.
85 *Australasian Builder & Contractor's News,* 20 October 1888, p 350.
86 Brian Roberts, *The Quest for Comfort* (no place or date [London c 1997]), pp 80, 82.
87 Franklyn, *A Glance at Australia, in 1880,* p 345.
88 *Building, Engineering and Mining Journal,* 15 August 1892, pp 65, 66 & illustration.

Sydney.[89] This seems surprising, for the idea of a machine which would not operate when the water pressure was low, and which wasted water prodigally when it did operate, was by now somewhat outmoded.

e. passenger lifts

Whether or not the high-rise buildings of the 1880s and 1890s can be called skyscrapers, they were made possible solely by the advent of the passenger lift. It cannot really be argued that they were dependent upon the development of wrought iron and steel frames, as were the taller skyscrapers of the United States, for some American buildings in conventional masonry were taken to heights comparable with the Australian buildings. There can be no doubt that it was the passenger lift that made our high-rise city buildings *economically* viable. To make the upper floors into lettable space the passenger lift was required. To be accepted by the general public the lift had to be swift (unlike the lumbering hydraulic lifts already operating in many warehouses), safe (unlike the earlier mine cages), reliable, and reassuring in appearance.

Although the passenger lift had apeared in New York in 1857, that was somewhat exceptional, for the first in Chicago was in 1872,[90] and Australia was in advance of this. The lift with a speaking tube specified by Horbury Hunt in December 1864 for the Union Bank, Sydney,[91] must be presumed to have been for passenger purposes, and it appears to be the first example in Australia. In 1877 the house of William Campbell, MLC, in Spring Street, Melbourne, was built with two hydraulic lifts, apparently for passenger purposes.[92] A passenger lift was installed at about this time in the Public Works Office in Sydney, but the idea was really brought before the public by the Whittier Machine Company of Boston, Massachusetts, in their display at the Sydney International Exhibition of 1879. The company's representative, Alonzo C Seaver, accompanied the exhibits to Sydney.[93] They included a goods lift for warehouse use, and a 'double screw steam elevator' or passenger lift. When the exhibition closed it was installed in Toohey's Brewery.[94]

In 1880 the Melbourne drapers Craig, Williamson & Thomas advertised that they had in their Elizabeth Street building a hydraulic lift 'comfortably seated

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89 *Australasian Builder & Contractor's News,* 22 December 1888, p 576. See also 4 Janusry 1890 advertisements: the managing director was Sidney E Squire, and the company claimed to have received the highest encomiums from eminent hydraulic engineers.

90 Theodore Turak, *William le Baron Jenney: a Pioneer of Modern Architecture* (Ann Arbor [Michigan] 1986), p 170.

91 Peter Reynolds & Joy Hughes, 'The Blacket Years: Works 1863-1869', in Peter Reynolds, Lesley Muir & Joy Hughes [eds], *John Horbury Hunt: Radical Architect 1838-1904* (no place [Sydney] 2002), p 40.

92 *Argus,* 21 January 1882, p 2.

93 John Wade [ed], *Sydney International Exhibition 1879* (Sydney 1979), p 45, quoting the *Official Record of the Sydney International Exhibition 1879* (Sydney 1881).

94 J M Freeland, *Architecture in Australia - a history* (Melbourne 1968), p 161.

and cushioned for passenger traffic',[95] in 1881 a lift was installed at Farmer's store in Sydney,[96] and others followed. In 1884 Johnson's 'Industrial Buildings' in King William St, Adelaide, had a hydraulic passenger lift.[97] In 1886 the investor Friedrich Wilhelm Prell completed a block at 7-11 Queen Street, Melbourne, (later known as the Felton Building) to the design of F M White. It consisted of three floors plus basement, and had lifts at the rear,[98] though it is unlikely that they were fast passenger lifts. In Sydney the engineer J J Patterson was by 1886 advertising 'Patterson's Patent Passenger and Goods Elevators', each worked by a $3^1/_2$ horsepower [2.6 kW] engine said the be the most economical on the market.[99] In 1887 Gibbs, Bright & Co of Pitt Street installed what seems to be the only reported Australian example of a paternoster, or what was described as a 'cyclic hoist or passenger lift'. Eight cages, each accommodating two passengers, were continuously moved by an endless chain powered by a four horsepower [3 kW] gas engine.[100]

There were six Otis lifts in Sydney, but still none in Melbourne,[101] when W F Hall, Vice-President of the Otis Company in America, came on a holiday visit in 1886.[102] He is supposed to have been struck by the absence of tall buildings, and to have predicted that with its increasing population Melbourne would soon have to build upwards like Chicago and New York. He put this view to F W Prell, who was then putting up a four storey building in Queen Street, and convinced him that if he had passenger lifts he would get as good a rent for the upper floors as for the ground floor. In consequence of this Prell is reported to have added two storeys[103] and installed lifts,[104] and it was finished in 1887.[105] This has been assumed by modern writers to be the Lombard Building at 15 Queen Street, but this is apparently incorrect,[106] and

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95 *Argus,* Exhibition Supplement, 2 October 1880, p 2. It was supposed to have 'patent safety gear attached': Franklyn, *A Glance at Australia, in 1880,* p 290.

96 J M Freeland, *Architecture in Australia - a History* (Melbourne 1968), p 165.

97 *South Australian Register,* 13 August 1884, p 5.

98 *Argus,* 26 June 1886, p 9.

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

100 *Australasian Builder & Contractor's News,* 3 September 1887, p 269.

101 Taylor, 'Marvellous Melbourne's Sky-Scrapers', p 4; Geoffrey Serle, *The Rush to be Rich* (Melbourne 1971), p 252; Otis Catalogue.

102 Blainey, *Johns and Waygood.* 19, says Hall came in 1884, and Taylor, p 6, quotes a similar statement by E J Rigby, former director of Austral Otis (*Australasian Builder and Contractor's News,* 2 May 1891), but he is not in the shipping lists at that time, and he was certainly here for nine months in 1886-7 (Taylor, p 4, ref *Age,* 20 August 1887, and Select Committee on the Hydraulic System Bill).

103 According to *Australian Hardware Journal,* 1 June 1887, and to the Mahlstedt maps, 15 Queen Street was of only five storeys).

104 Blainey, *Johns and Waygood,* p 19.

105 *Australian Hardware Journal,* 1 June 1887, cited by Taylor.

106 The Lombard Building was neither built for Prell, nor of the correct date. Late in 1887 the merchants Balfour, Elliott & Co, who were renting space in Prell's building next door, acquired the 51 foot [15.3 m] site and proceeded 'to raze the old buildings and erect a palatial pile of offices on the ground' (*Journal of Commerce,* 20 September 1887). It is identified as the Lombard Building by Andrew Lemon, *The Young Man from Home* (Melbourne 1982), p 102. Melbourne City Council application no 3676 of 9 October 1888, describes it as an eight storey building in Queen Street for Balfour, Elliott & Co; architects Reed, Henderson & Smart; builder H Lockington. The account of the

it seems that the building in question was at the Flinders Lane corner.[107] Prell then went on to build two or three further buildings of nine storeys around the south end of Queen Street in about 1888.[108] F M White had designed the 1886 building, and the last three were designed by F M White & Son, but the Lombard Building is the work of other architects. Austral Otis lifts were installed at the Premier Permanent Building Association offices in 1887.[109]

In 1887, even before the construction of Prell's three larger buildings, there were also major lift installations in the Federal Coffee Palace in Collins Street, and Wallach Bros at the corner of Elizabeth and Flinders Streets, for Fink & Avory.[110] The passenger lift at Wallach Bros was described as being 'fitted up regardless of expense - mirrors line the walls and the seats are elegantly upholstered in peacock blue plush'. At this time the Austral Otis Company was formed, with Benjamin Fink as chairman and W F Hall as one of the directors. Hughes, Pye and Rigby were made agents, and Rigby was also a director.[111] In 1887 two hydraulic lifts of unspecified manufacture were installed in the *Courier* office in Brisbane, designed by Richard Gailey, one of them a goods lift, and the other a 'passenger saloon with the latest improvements'.[112] In 1888 the first Otis hydraulic lift in Brisbane was installed in Carew, Gardner & Billington's drapery in Edward Street, and in the following year an 'Otis Standard Hydraulic Passenger Elevator' was installed in the Brisbane Treasury building.

Meanwhile Peter Johns converted his business into a public company in 1888, as the 'Johns Hydraulic & General Engineering Co.', and he was producing lifts in competition with Otis.[113] The English firm of Richard Waygood & Co had been the European rivals of the Otis Company, and they were responsible for the two 'specially constructed' hydraulic lifts of the

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additional storeys could apply, for it was first reported to be of five storeys in the *Australian Hardware Journal,* 1 June 1887, cited by Taylor. As completed, and as it stands today, it is of seven storeys, counting the basement: Mahlstedt maps.

107 MCC application no 2582 of 5 January 1887 was for a four storey building at the corner of Queen Street and Flinders Lane for F W Prell; architect F M White; builder David Mitchell.

108 Sutherland, *Victoria and its Metropolis,* II, p 537, appears to refer to two buildings of 1888 and at least two of 1886 or earlier. MCC application 3102 of 17 October 1887 is for an eight storey building for Prell at the corner of Queen and Collins Street, architect F M White & Son, builder David Mitchell. This building and one of those at the corner of Flinders Lane and Queen Street, both of eight storeys, were reported in October 1887 as being in progress: *Australasian Builder and Contractor's News,* 29 October 1887, p 396. The former was said to replace the 'Grecian' Bank of New Zealand, but this must have been intended to be the latter, as the bank (by Robertson & Hale) was at the south-west corner of Queen Street and Flinders Lane. For no 34, at the south-east corner of Flinders Lane, Taylor quotes *Building, Engineering and Mining Journal,* 13 October 1888, p 311, and 6 September 1889.

109 *Australasian Builder & Contractor's News,* 9 July 1887, p 140. This was at 229 Collins Street [modern numbering], built in 1885-7 to the design of C A D'Ebro.

110 Taylor, 'Marvellous Melbourne's Sky-Scrapers', p 5, ref *Australasian Builder and Contractor's News,* 27 August 1887.

111 Taylor, 'Marvellous Melbourne's Sky-Scrapers', p 6, ref Austral Otis records, MU Archives; *Australian Hardware Journal,* June 1887, p 146.

112 *Australasian Builder & Contractor's News,* 2 July 1887, p 131.

113 Blainey, *Johns and Waygood,* pp 16-17, 19.

Courier Building in Brisbane of 1885-7,[114] and those of the Federal Coffee Palace in Melbourne in 1887,[115] Hoffnung & Co's building in Sydney, and D & W Murray's in Adelaide.[116] Their Melbourne agent was Frederick Glass,[117] and their lifts were also used to carry passengers to the dome of the Exhibition Buildings at the 1888 Exhibition in Melbourne. In November 1888 they formed a local company, the Australian Waygood Elevator Company, and immediately got the contract for the lifts of the Australian Building, at the corner of Elizabeth Street and Flinders Lane. This had been planned to be of fifteen storeys, and though it was ultimately reduced to twelve, it was still 45 metres high - taller than any European office building, and comparable with the new American skyscrapers. It remained for a very long time Australia's tallest building.[118]

In the Australian Building one twelfth of the total cost was spent to obtain what were said to be the safest lifts known to modern engineering. They were therefore of the type which made no use of cables, but rested directly on top of a steel ram rising out of the hydraulic cylinder. This meant that the cylinder had to be sunk into the ground by the same distance the lift had to rise, a depth of 39 metres. In reality it was by no means as safe as it seemed, for many years later one of the cylinders burst and a lift fell all the way from the top floor. Luckily it was empty at the time. The Waygood company over invested in manufacturing plant and was badly hit by the recession of 1891. After long negotiations it was sold to the Johns Hydraulic Co, which in February 1892 became Johns & Waygood.

By 1892 about 70% of the lifts on the Melbourne system were made by either Waygoods or Johns, and when the two amalgamated the Austral Otis Company fell back to a very minor position in the trade. By the 1930s the Standard Waygood Company of Sydney had branches in all states except Victoria, and claimed to have been formed in 1888 - presumably meaning that it claimed succession to the Australian Waygood Company. Its apparatus was said to be of entirely Australian design.[119]

f. the hydraulic power system

A crucial step during these years had been the establishment of a reticulated hydraulic system. Before this time each building, unless it relied upon the inadequate mains pressure, had its own engine to provide the hydraulic

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114 *Australasian Builder & Contractor's News,* 3 September 1887, p 275, OR 10 September 1887, p 284 - CHECK.

115 *Australasian Builder & Contractor's News,* 20 December 1889 [incorrect ref]; Cannon, *Land Boom and Bust,* p 69.

116 *Australasian Builder & Contractor's News,* 3 September 1887, p 275, OR 10 September 1887, p 284 - CHECK.

117 *Australasian Ironmonger,* 1 October 1886, advertisement p x.

118 *Australasian Builder & Contractor's News,* 20 December 1889 [incorrect ref]; Cannon, *Land Boom and Bust,* p 69; Blainey, *Johns and Waygood,* pp 33-4.

119 C E Mayes, *The Australian Builders & Contractors' Price Book* (8th ed, Sydney 1938), advertisement p 10.

pressure for the lifts. These still operated at low pressure, and the water was drained away and wasted - to the extent of nearly 2,300 million litres a year in 1887.[120] The Melbourne Hydraulic Power Company was formed in 1886 to supply Melbourne with 'motive power on the high pressure hydraulic system for the extinguishing of fires and other purposes'.[121] In other words, this was to be high pressure hydraulic power, and it would help with fighting fires in high buildings beyond the reach of mains pressure. The *Hydraulic Systems Bill* was put to Parliament in 1887 and a select committee appointed to consider it. W F Hall pointed out that all Otis passenger lifts for the past ten years had been hydraulic, and that on the proposed system the water would be recirculated rather than wasted. Only three other cities in the world, Hull, London and Liverpool, had a public supply of hydraulic power.[122]

John Coates was the managing director of the company, and his nephew George Swinburne was the engineer.[123] Swinburne delivered a paper to the Victorian Architectural and Engineering Association on 5 November 1888 in which he described progress. A site for the pumping equipment had been obtained from the Harbor Trust on the Yarra Bank below the Gasworks (in fact at the corner of North Wharf Road and Piggott Street). Two six inch [150 mm] mains were laid from here to the corner of Spencer and Flinders Streets, from whence they were to diverge along either street, and from these branches would serve the whole central area. Not only would the system serve passenger and goods lifts, cranes on the wharves, &c, but also fire hydrants with sufficient pressure to fight fires in high buildings. These were on a new patent by Greathead and Martindale, in which a small jet of high pressure water from the hydraulic system was injected into a larger volume of mains pressure water, with the effect that a jet of 680 litres a minute could be delivered to a height of more than thirty metres.[124]

By July 1889 the Company had extended one trunk main as far as Parliament House,[125] and the first use was made of the system to work the lifts in Prell's buildings in Queen Street.[126] By the end of the year seventy lifts were connected, of which 37 were made by Peter Johns (these being mainly goods lifts).[127] By the middle of 1890 there were 250 lifts connected, and the majority were passenger lifts of the more advanced types like Austral Otis.[128]

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120 *Select Committee on the Hydraulic System Bill,* p 14.

121 Taylor, 'Marvellous Melbourne's Sky-Scrapers', p 27.

122 Blainey, *Johns and Waygood,* p 23.

123 See Alison Patrick, 'George Swinburne (1861-1928)', in G C Bolton et al [eds], *Australian Dictionary of Biography,* XII, (Melbourne 1990), pp 150-2.

124 *Australasian Builder & Contractor's News,* 17 November 1888, pp 439-440. According to Miles Pierce, in a lecture at Engineering House, Melbourne, 15 June 2006, the system at Hull was established by Sir William Arstrong in 1876, and the more extensive systems of London and Liverpol in 1883 and 1885 respectively. Ultimately eight cities, including Melbourne and Sydney, had such systems. In 1890 the Public Works Department offered water from Dight's Falls to the Melbourne company, as the water downstream was unsuitable.

125 Blainey, *Johns and Waygood,* p 23.

126 *Australasian Builder & Contractor's News,* 30 July 1887, p 26.

127 Blainey, *Johns and Waygood,* p 23.

128 Taylor, 'Marvellous Melbourne's Sky-Scrapers', p 35.

The company operated until its franchise expired in 1925, when the system was taken over by the Melbourne City Council.[129]

Sydney's hydraulic power company was established in 1891, two years after Melbourne's, and from now on mechanical lifts were for a short time entirely superseded by hydraulic ones. By April 1892 there were three hundred lifts connected. By mid-1912 a total of 698 hydraulic machines - lifts, hoists, cranes, wool presses &c - were in operation, and the mains extended forty-two kilometres through Sydney.[130] By 1949 the system was operated by the Hydraulic Power Electric and Hydraulic Lifts Ltd of Darling Street, at a pressure of 700 lb per square inch [4.8 MPa] over eighty kilometres of mains in central Sydney. Although nobody was now advertising hydraulic lifts the company asserted slightly defensively that the hydraulic lift 'which has give such reliable service in the past is still the most satisfactory type for certain requirements',[131]

g. electric lifts & escalators

Mechanical lifts reappeared in Australia only after the turn of the century, when they began to be operated by electricity. The first electric lift had been demonstrated by Werner Siemens at the Mannheim Exhibition of 1880. It was not entirely satisfactory, and he developed an improved version in the following year. In 1889 much more sophisticated types were shown at the Paris Exposition by Chrétien of Paris and Otis of New York.[132] New Zealand was far in advance of Australia in this area, for an electric lift was installed in the Grand Hotel, Dunedin, in 1883, and John Stacpoole has surmised that this may have been connected with the fact that Sir Julius Vogel had visited the country in the previous year as representative of the Electric Lighting Company.[133] By 1904 there were fifty electric lifts installed or underway in Sydney, but only seventeen in Melbourne.[134]

Amongst the earliest electric lifts in Australia were those of 'Melbourne Mansions', David Syme's controversial flats in Collins Street, Melbourne, of 1905. Here there were two electric lifts for passengers and six for food and parcels.[135] The Sydney Town Hall lift, instalkled by Waygood & Co in 1906,

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129 According to Pierce the Melbourne system reverted to the Melbourne City Council in 1925 and closed in December 1967.

130 *Salon,* I, 1 (July-August 1912), advertisement p v.

131 F W Ware & W L Richardson [eds], *Ramsay's Architectural and Engineering Catalogue* (Melbourne 1949), §47/4. According to Pierce the Sydney closed in 1975 and London in 1976.

132 Jean Gavois, *Going Up* (no place, 1983), pp 108-9, ref *Elecktrotechnische Zeitung,* 1880, and *La Lumière Electrique,* 1889.

133 John Stacpoole, *William Mason* (Auckland 1971), p 122.

134 H R Harper, 'Electrical Installation Work: with Remarks on some of the Well-Known Appliances of Electricity', *Journal of the Royal Victorian Institute of Architects,* II (November 1904), pp 159-60.

135 Robert Haddon, 'Australian Architecture', in G A T Middleton [ed], *Modern Buildings* (6 vols, London, no date [c 1910]), V, p 151.

still operates today.[136] The Commercial Travellers Club building in Melbourne. of 1913, was the first in that city to have what were reported as 'quick lifts', a US system in which different lifts ran to different levels, some going non-stop to priority areas of the building.[137] At the Australia Hotel in Melbourne, of 1938-9, The lifts (referred to as 'elevators') were two high speed cars operated by gearless traction machines on a system according with the then state of the art. Signals were automatic, so that the car stopped in response to signals from waiting passengers, independent of any control from within the car, and a two-car despatching device was designed to ensure optimum timing. There were two sets of double doors to each car, which opened and closed automatically.[138] Electric lifts also appeared in private houses like 'Dalvui', western Victoria, of 1907-8,[139] and 'Mount Pleasant', near Launceston, probably installed in 1924.[140]

The escalator was not nearly so significant a development as the lift, and of course was used in a very different way, to shift large numbers of people between only a few levels of building. The first escalator, in the sense of a rolling staircase rather than a moving belt, was developed in 1892 by C D Seeberger and the Otis Elevator Co, and one was installed by Otises at the Paris exhibition of 1900, and was afterwards put into a Philadelphia Department Store.[141] The demand was in fact almost entirely confined to large retail stores, and John Martin & Co of Adelaide installed escalators in 1933.[142] The first escalators in Melbourne, however, were installed in a multi-tenanted complex, the Manchester Unity Building at the corner of Collins and Swanston Streets, also completed in 1933.[143] Escalators were opened in the Myer Emporium about a year later.[144] By 1949 Waygood Otis could claim sixteen installations in Australia, half of them in Sydney.[145] The Hydraulic Power, Electric and Hydraulic Lifts Ltd of Sydney was advertising the Express Westinghouse system, but it is not clear whether they had found any takers.[146]

The revolving floor appeared in Australia in 1959, at a restaurant in Katoomba, New South Wales. A fifteen metre diameter section of the floor revolved every five minutes, driven only by a two horsepower [1.5 kW] motor.[147] It was the predecessor of many revolving restaurants, many at the

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136 *Sydney Morning Herald,* 19 December 2006, read on line..

137 *Herald,* 6 February 1913, p 3, quoted in Peter Barrett, draft MPD thesis (2001), p 95.

138 *Hotel Australia Melbourne, 1939* (Melbourne 1939); 'Hotel Australia, Collins Street', *Journal of the RVIA,* XXXVII, 7 (September 1939), pp 191-201.

139 Ussher & Kemp called tenders for the electric lift, lighting, heating and refrigeration, in the *Argus,* 25 July 1908, p 3.

140 Inspected 2006: 1924 is the date of the of the surviving switchboard, which seems to have been part of an extensive electrical fitout.

141 Roberts, *The Quest for Comfort,* p 80.

142 *Modern Store,* I, 10 (January 1937), p 41.

143 Geoffrey Serle, *Robin Boyd: a Life* (Melbourne 1995), p 37.

144 Miles Lewis, *The Myer Store Buildings* (mimeographed report, Melbourne 1987), p 28. See also the illustration in *The Modern Store,* I, 4 (May-June 1936), p 39.

145 *Ramsay's Catalogue* [1949], § 47/3.

146 *Ramsay's Catalogue* [1949], § *47*/4.

147 *Cross-Section,* no 81 (1 July 1959), p 1.

top of tower blocks, and invariably associated withexcessive prices and poor cuisine.