

11.02 Paper & Papier Mâché

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a. oiled papers and fabrics

Impregnated cloths and papers have a history going back to antiquity, and by the Renaissance such materials were a standard filling for windows in much of Europe.¹ The traditional English 'fenestrall' was a framed blind of cloth or canvas soaked in oil, or, from the Tudor period, linen similarly treated.² R A Stevens claims that medieval cottage windows in Bristol were of linen soaked in mutton fat.³ In Hormanus, in 1519, appears the passage 'Glasen wyndowis let in the lyght, and kepe out the winde; paper or lyn clothe straked acrossse with losyngz make fenestrals instede of glasen wyndowes.'⁴ Thomas More described the windows in his *Utopia* as containing, if necessary, 'linen smeared with translucent oil or amber' as a substitute for glass,⁵ while the strangers' house in Francis Bacon's *New Atlantis* has handsome windows, some of glass and some of 'a kind of cambric oiled'.⁶

In the eighteenth century oiled paper windows were in use at Jaques de Vaucauson's silk factory at Aubenas, near Lyon.⁷ Oiled paper was used in Quebec,⁸ and also in the United States from at least the seventeenth century,⁹ though, according to Donald

¹ Witold Rybczynski, *The Perfect House* (New York 2002), p 55, points out that the Venetian Republic was something of an exception in the sixteenth century, because glass making was a local industry, and the material plentiful and relatively cheap.

² Henry Batsford & Charles Fry, *The English Cottage* (London 1938), p 18.

³ R A Stevens, *Building in History* (London 1965), p 38.

⁴ Hormanus, *Vulgaria* (London 1519), pp 242-2, quoted in Wyatt Papworth [ed], *The Dictionary of Architecture* (London 1853-92), sv Fenestral.

⁵ Thomas More [ed Edward Surtz], *Utopia* (New Haven [Connecticut] 1964), p 66. This at a time when glass was scarce and oiled linen, lattice work and horn were commonly used: Surtz, quoting *A Relation, or Rather a True Account, of the Island of England ... About the year 1500* [translated C A Sneyd, London 1847], p 112, n 71.

⁶ Francis Bacon, *New Atlantis* (London 1626), in *Famous Utopias* (introduced by C M Andrews, New York [1901]), p 239.

⁷ See Vaucauson's, *Memoires*, and J de Vaucauson, 'Sur le Choix de l'Emplacement sur la Forme qu'il faut donner au Bâtiment d'une Fabrique d'Organs', *Histoire de l'Académie Royale* (Paris 1776), p 168.

⁸ Harold Kalman, *A History of Canadian Architecture* (2 vols, Toronto 1994), I, p 53.

⁹ Hugh Morrison, *Early American Architecture from the First Colonial Settlements to the National Period* (New York 1952), p 34.

Hutslar, not so frequently as popular tradition would have us believe.¹⁰ It was in this tradition that both linen and 'oil paper' were used for windows in early nineteenth century South Africa.¹¹ R S Burn's *Colonist's and Emigrant's Handbook of the Mechanical Arts* describes a window sash which a settler could make, glazed in thin sheet gutta percha or, alternatively, in calico, which was painted with boiled linseed oil.¹² When glass finally reached the South African colony of Natal in 1853 Eliza Feilden was delighted, because her calico windows darkened the interior, and were beginning (after a year) to show signs of wear.¹³ Even so St Paul's Church, Durban, begun in that year, had to open with windows of oiled calico, when it turned out that the glass originally supplied was of the wrong size.¹⁴

In about 1840 G R Hawker's huts at 'Bungaree' station, South Australia, had calico windows,¹⁵ but a German settler in South Australia would put linen across the window opening only if the weather became too windy.¹⁶ During the 1840s McCraes' house 'Mayfield', at Abbotsford near Melbourne, had unbleached linen in the window frames, as a temporary measure until glass could be obtained.¹⁷ Similarly, a church in Light Square, Adelaide, in 1845 had windows covered in calico, which was due to be replaced by glass shortly.¹⁸ More elaborately than this, the Rev J B Wollaston in 1842 used 'calico prepared with oil and turpentine and painted with cross-stripes in imitation of Quarries' for the windows of St Mark's Church at Picton, near Bunbury in Western Australia.¹⁹ In 1848 he was again buying calico for the temporary windows of his church at Albany, 'strong and good', at ninepence a yard.²⁰ Even in the 1860s Janet Millett found windows glazed with calico in poorer Western Australian houses.²¹

This was by no means a primitive expedient. Framed canvas windows, which were apparently specially treated, were used in a pavilion made by Henry Manning for the Royal Agricultural Society. This was set up at various English sites during the 1840s.²² Manning's rival, Peter Thompson, built a temporary church at Kentish Town

¹⁰ D A Hutslar, *Log Construction in the Ohio Country 1750-1850* (Athens [Ohio] 1992 [1986]), p 10.

¹¹ R B Lewcock, *Early Nineteenth Century Colonial Architecture in South Africa* (Cape Town 1965), p 228.

¹² R S Burn, *The Colonist's and Emigrant's Handbook of the Mechanical Arts* (London 1854), p 80.

¹³ Brian Kearney, *Architecture in Natal* (Cape Town 1973), p 16, ref E W Feilden, *My African Home 1852-1857* (1882), p 25.

¹⁴ Désirée Picton-Seymour, *Victorian Buildings in South Africa* (Cape Town 1977), pp 233/235.

¹⁵ Colin Kerr, *'An Exellent Coliney'* (Adelaide 1978), p 132.

¹⁶ Ian Harmstorf & Michael Cigler, *The Germans in Australia* (Melbourne 1985), p 68.

¹⁷ Brenda Niall, *Georgiana* (Melbourne 1994), p 143.

¹⁸ *South Australian Register*, 31 December 1845, cited in E & R Jensen, *Colonial Architecture in South Australia* (Adelaide 1980), p 76.

¹⁹ J R Wollaston [ed A Burton], *Wollaston's Picton Journal* (Nedlands [Western Australia] 1975), p 97. Within eight months the windows had been spoiled by neighbouring cattle: *ibid*, p 194.

²⁰ J R Wollaston [ed C A Burton & P U Henn], *Wollaston's Albany Journal (1848-1856)* (Perth 1954), p 63.

²¹ [Janet] Millett, *An Australian Parsonage* (London 1872), p 63.

²² *Illustrated London News*, III, 63 (15 July 1843), pp 35, 40, 41; VII, 168 (19 July 1845), p 40; IX, 220 (18 July 1846), pp 44, 45; XIII, 326 (15 July 1848), p 17; *Builder*, IV, 162 (1 August 1846), p 371.

in 1844, with clerestory windows of 'vitreous cloth'.²³ This may have been either Gerald Arney & Co's Transparent Waterproof Glaze Linen or Calico, said to be suitable for skylights or conservatories, or the transparent sheeting of Thompson's neighbour, Robert Richardson.²⁴ As late as 1880 unbleached calico, apparently with no treatment at all, was used to glaze the windows of the Government Resident's hut at Palmerston (Darwin).²⁵ At the sawmilling settlement of Wilgi in Western Australia the windows were also covered in calico - if anything at all - and there was little glass in use until after World War I.²⁶

Oiled paper and fabric were also used for blinds within glazed windows, sometimes of a highly decorative nature. In 1807 Robert Lugar published a design for a dairy, in which he proposed that there would be 'oiled paper blinds' within each of the glazed windows, and exactly fitting the openings, which implies that they were on timber frames.²⁷ A number of designs for 'transparent blinds' are illustrated in Nathaniel Whittock's *Decorative Painters' and Glaziers' Guide* of 1827, with classical and medieval buildings set in landscapes,²⁸ one of which is shown in full colour.²⁹ Whittock explains that blinds are usually painted on fine Scottish cambric or lawn, which can be obtained in any required width, but must be of uniform thickness and free of blemishes. It must be strained before it can be sized, and he shows a frame used for the purpose, consisting of timber bars at either side, through which horizontal rods pass at the top and bottom. Strips of 'list' are sewn onto the selvage at either side of the blind, and these strips are fitted into grooves in the timber bars and held there by screwing an iron strip onto each. The ends of the blind have pieces of tape sewn on, which are tied over the transverse rods and the rods can be turned to keep the whole in tension. They are first screwed enough to make the blind even, but not tight, and the size is applied. For small and special examples isinglass [sodium silicate] is used, but for larger blinds a parchment size can be used, made by boiling parchment scraps obtained from law stationers. After the size is brushed on the cloth will be quite loose, so it is screwed tighter, and once dry it will be stiff enough to paint on.³⁰

In 1834 Joseph Stubbs of London was reportedly producing very fine blinds of this type, including a view of the Thames Tunnel.³¹ A number of painted blinds were shown at the Great Exhibition of 1851 by English makers,³² as well as J W & F G Caley's 'Diaphane', a transparent silk for blinds, some of which, bearing the star of the

²³ *Illustrated London News*, V, 123 (7 September 1844), p 156; *Builder*, II, 84 (14 September 1844), p 371.

²⁴ *Builder*, II, 24 (23 November 1844) p 588; IV, 191 (3 October 1846), p 479.

²⁵ Harriet Daly, *Digging, Squatting, and Pioneering Life in the Northern Territory of South Australia* (London 1887), p 51.

²⁶ David Mack, *he Shepherdsons: Timber Milling in Australia 1849-1984* (Camden Park [South Australia] 1896), p 11.

²⁷ Robert Lugar, *The Country Gentleman's Architect* (London 1807), p 13.]

²⁸ Nathaniel Whittock, *The Decorative Painters' and Glaziers' Guide* (London no date [1827]), pl 45.

²⁹ Whittock, *Decorative Painters' and Glaziers' Guide*, pl XLIV.

³⁰ Whittock, *Decorative Painters' and Glaziers' Guide*, pp 194-6 & pl XXXVII.

³¹ *Architectural Magazine*, I [1834], p 127.

³² Such as Edward Wells and H W Noel: London, Great Exhibition of the Works of Industry of all Nations, 1851, *Official Descriptive and Illustrated Catalogue* (3 vols, London 1851), II, pp 753, 759.

Order of the Garter had been manufactured for Windsor Castle.³³ Others were shown from Prussia³⁴ and Hamburg.³⁵ The fashion for painted blinds seems to have declined rapidly after the mid-century.

b. papier mâché and carton pierre

The idea of papier mâché seems to have originated in the East, but by the sixteenth century picture frames and various small items were being made from it in Britain.³⁶ The material had appeared in Paris by 1740,³⁷ and by the late eighteenth century the English were using it as a substitute for plaster in ceiling ornaments, notably at Horace Walpole's 'Strawberry Hill'.³⁸ Early in the nineteenth century it was used to face the walls of a church at Bergen, Norway, being made waterproof by treating it with dilute sulphuric acid and lime slaked with whey and white of egg.³⁹ The material which is later usually described as *carton pierre* was developed in the eighteenth century for purposes such as roofing, as will appear below. In 1772 Richard Clay of Birmingham obtained a patent for a version which consisted of a spongy paper pasted in successive layers over metal cores or moulds. It was used not only for architectural ornaments but for small articles such as writing cases.⁴⁰ In 1788 Charles Lewis Ducrest of London patented a process 'for making paper for the building of houses, shops, boats and all kinds of wheeled carriages, sedan chairs, tables, book-cases either of paper or wood and iron covered with paper.'⁴¹ The paper was pasted over moulds, kiln-dried and varnished, suggesting that it too was basically carton pierre, and room-sized boxes of this material were to be piled up and bolted together to create a house.

By the end of 1847 the usual method of manufacture was to press sheets of brown paper, with glue between, onto a suitably shaped mould, remove and trim the resultant shell, press a mixture of pulp and rosin into the same mould, and then take this out and press it into the prepared shell.⁴² In England the pulp was generally mixed with resin and glue, and in France with whitening and glue, and in both cases it was pressed into boxwood or plaster moulds, backed with glued paper. In England this paper was pre-moulded, as provided in Clay's patent, but not in France.⁴³ Up to 1846

³³ London, Great Exhibition, 1851, *Catalogue*, II, p 564.

³⁴ London, Great Exhibition, 1851, *Catalogue*, III, pp 1057, 1061.

³⁵ London, Great Exhibition, 1851, *Catalogue*, III, p 1137.

³⁶ Malcolm Airs, 'Paper Roofs in the Nineteenth Century: Theory and Practice in Oxfordshire' (typescript of a paper read to the British Archaeological Association, 1992), p 1, refers to Robert Boyle's essay 'of Man's Great Ignorance of the Uses of Natural Things' in which reference is made to these articles.

³⁷ Wyatt Papworth [ed], *The Dictionary of Architecture* (London, 1853-1892), sv Papier-Mâché.

³⁸ S S De Voe, *English Papier-Mâché of the Georgian and Victorian Periods* (London 1971), p 30.

³⁹ Papworth, *Dictionary of Architecture*, sv Papier-Mâché.

⁴⁰ W C Aitken, 'Papier-Mâché Manufacture', in Samuel Timmins [ed], *The Resources, Products and Industrial History of the Birmingham and Midland Hardware District* (London 1866), pp 566-573.

⁴¹ De Voe, *English Papier-Mâché*, p 31.

⁴² Charles Tomlinson [ed], *Cyclopaedia of Useful Arts & Manufactures* (London, in parts, c 1852)

⁴³ Papworth, *Dictionary of Architecture*, sv Cartonpierre.

most of the better quality papier-mâché work in England was made by Clay's process, but then new methods of using the pulp were devised by Brindley and T H Jennens.⁴⁴ At the Great Exhibition Jackson & Sons showed a 'Compartment of decoration, in carton-pierre, in high relief, for a large saloon', as well as other architectural elements such as a caryatid, string course, entablature, pilasters, and large ceiling flowers.⁴⁵ C F Bielefeld showed other architectural material, as will appear below.

Although these products tended to be superseded by fibrous plaster, carton pierre enrichments were still being advertised in Britain in 1913.⁴⁶ There is not a big step from these products to the cardboard-like millboards and composition boards which have already been discussed in the context of building boards in general - nor to the waterproof versions which will be discussed, below in the context of tarred paper and related products.

c. C F Bielefeld

Meanwhile, in 1826 Charles Frederick Bielefeld had developed his own improved form of papier mâché, and soon after published his *On the Use of the Improved Papier-Mâché*,⁴⁷ subsequently followed by his other well-known catalogues: in 1835 *Gothic Ornaments*, in 1843 his *Architectural Ornaments*, containing a thousand patterns, and in 1853 his *Ornaments in Every Style*.⁴⁸ Bielefeld had made his own way in the industry from scratch. He was born in 1803 and became a self-taught modeller, but then turned to the commercial production of papier mâché, gradually assembling a number of cast metal dies of his own designs, until, by the time of his death in 1864, they numbered some hundreds and weighed fifty tonnes. In 1832 he made the papier mâché decorations of the Pantheon in Oxford Street, and soon afterwards began publishing his famous catalogues.⁴⁹ At the Great Exhibition of 1851 he showed Corinthian capitals and 'a variety of architectural ornaments'.⁵⁰ The *Art Journal Catalogue* illustrated five of these specimens and explained that he had manufactured 'almost entirely for the trade', supplying architects, builders and decorators with the ornaments they required for their buildings.⁵¹ He exhibited again at Dublin in 1853, including three centre flowers, one resembling some found in Australia.⁵²

⁴⁴ Aitken, 'Papier-Mâché Manufacture', loc cit.

⁴⁵ London, Great *Exhibition*, 1851, *Catalogue*, II, p 730. However the *Art Journal Illustrated Catalogue*, pp 55-7, illustrated only their furniture and small ornamental articles. Other papier mâché makers not reported as making architectural items were Walton & Co of Wolverhampton (pp 92-9), McCullum & Hodgson of Birmingham (pp 156, 209), H Clay of London (p 190), Halbeard & Wellings of Birmingham (pp 250, 251), Jackson & Sons of London (p 237), and Spiers & Son of Oxford (p 255).

⁴⁶ C H Reilly [ed], *The Liverpool Architectural Sketch Book*, III (London 1913), p vi.

⁴⁷ C F Bielefeld, *On the Use of the Improved Papier-Mâché in Furniture, in the Interior Decoration of Buildings, and in Works of Art* (London, no date [c 1835]). The date of 1826 for his invention is given in the new edition of this work (London 1850), p 7.

⁴⁸ C F Bielefeld, *Ornaments in every Style of Design, practically applicable to the Decoration of the Interior of Domestic and Public Buildings* (London 1850).

⁴⁹ *Journal of the Society of Arts*, XII, 589 (4 March 1864), p 259.

⁵⁰ London, Great *Exhibition*, 1851, *Catalogue*, II, p 744.

⁵¹ London, Great *Exhibition*, *Art Journal Illustrated Catalogue*, p 61.

⁵² Dublin, *The Exhibition of Art-Industry in Dublin* (London 1853), p 14h.

Bielefeld, like Jennens and Bettridge, developed a trade in large ornamental wall panels for the partitioning of cabins in steamships,⁵³ and in 1851 'agents for the Pasha of Egypt' commissioned him to manufacture panels to line the complete interior of the Pasha's pleasure yacht, as previous experience had shown that decoration on wood and plaster split and fractured in the heat. Bielefeld leased a mill at Staines, Middlesex, where he experimented with the production of panels up to and beyond 2.1 metres square. These panels were about 40 mm thick, including a void space between the two outer layers, and were described as waterproof, soundproof, and capable of being sawn, nailed or screwed, but immune from warping or cracking. They could be finished like highly polished marble. All this was achieved by means of Bielefeld's newly patented system of manufacture in which, *inter alia*, he took rags as his raw material rather than rag paper.⁵⁴

In 1843 Bielfeld had obtained a patent for what sounds like the quaquersal looking glass,⁵⁵ but in 1845, 1846 and most importantly in 1851 he received various patents to protect his improvements in paper and papier mâché.⁵⁶ Under Bielefeld's 1851 patent large sheets were formed on a table with a rack on either side to carry a large roller, which passed back and forth to give the required pressure. The mixture began with a flour paste containing a proportion of alum [aluminium potassium sulphate] and copperas [ferrous sulphate]. Into this was mixed resin, boiled linseed oil and litharge [lead monoxide]. This mixture was used to bind the body, which consisted of rag dust or an equivalent material.⁵⁷

This product was at first known as 'fibrous slab' or 'patent wood', and it was used by Sydney Smirke to line the dome of the British Museum reading room, designed in 1856, in panel 6.6 x 3.5 metres, formed to a curved profile before installation.⁵⁸ By 1862, when Bielefeld exhibited panels of the actual designs used at the museum, he was calling the material 'patent siliceous fibre'.⁵⁹ It was said to be unflammable, heat and sound insulating, resistant to dry rot, and not subject to shrinkage or cracking, and was made in standard sheets of 7 by 13 feet [2.1 x 3.9 m], though available in larger sizes.⁶⁰ A little later the standard maximum size was 14 x 6 feet [4.2 x 1.8 m], in thicknesses from a quarter inch to one inch [6 to 25 mm]. When

⁵³ In 1838 Jennens & Bettridge were commissioned for 28 relief panels representing historical subjects for the Liverpool-Glasgow steamship, *Actaeon*. *Mechanic's Magazine*, XXX, 804 (5 January 1839), p 240. Bielefeld made ornaments for the Turkish steam packet. *Public Ledger*, quoted in [C F Bielefeld] *Portable Buildings, designed and built by Charles F. Bielefeld, Patentee* (London 1853).

⁵⁴ "The Pasha's New Boat", *Household Words*, no 87 (22 November 1851), pp 210-212.

⁵⁵ British patent no 9,601, 26 January 1843, for 'suspending looking glasses and other articles requiring like movements'.

⁵⁶ British patent no 10,935, 11 November 1845, to Charles Frederick Bielefeld, for the manufacture of embossed or pressed paper, calico, leather, and other fabrics and articles; no 11,289, 14 July 1846, for making moulds or dies used in the manufacture of articles of papier mâché, and other matters; moulding articles from certain plastic materials; no 13,531, 24 February 1851, for manufacturing sheets of papier mâché or substances of the nature thereof

⁵⁷ *Builder*, IX, 451 (27 September 1851), p 616.

⁵⁸ Papworth, *Dictionary of Architecture*, sv Fibrous Slab. See also E L Tarbuck, *The Encyclopædia of Practical Carpentry and Joinery, &c* (Leipzig, no date [c 1860]), p 77.

⁵⁹ London Exhibition 1862, *Art Journal Catalogue*, p 51.

⁶⁰ *Builder*, XIV, 684 (15 March 1856), p 78.

used outside, or in damp situations, a coating of asphalt in naphtha could be applied. Another version of the slab was rolled between layers of canvas and, though flammable, was suitable for lightweight structures such as signboards.⁶¹

d. papier mâché in Australia

The first evidence of papier mâché in Australia is an advertisement in the *Sydney Herald* of 1837, in which Richard Kirk advertised a selection of centre flowers for ceilings, ventilators, cornices and other ornamental work, by an unnamed 'eminent Modeller in London'.⁶² The material was used by the Scott Brothers at 'Glendon' in 1840,⁶³ and by Mortimer Lewis at 'Fernhill', Mulgoa, where the drawing room ceiling and cornice enrichments were all from C F Bielefeld of London, whose stamp appears on the reverse sides.⁶⁴ Major Mitchell received a case of Bielefeld's product in 1844 for the decoration of 'Parkhall', including no less than eighty-six shields, possibly for use in cornices.⁶⁵ Examples still exist in Tasmania at 'Clarendon', Nile,⁶⁶ and 'Killymoon', in the Fingal Valley (c 1842-8),⁶⁷ and probably many other houses where it has not been recognised. In 1851 Bielefeld manufactured four giant Corinthian capitals, 6.6 metres in circumference, for a bank in Australia, and displayed another of them at the Great Exhibition.⁶⁸

It was Bielefeld's success with his 1851 patent and with large panels for steamships that enabled him to start making complete buildings of papier mâché. In 1853 it was reported that a 'magic village' of the material was about to be sent to Australia. It included a large and vaguely Elizabethan house, with nine rooms 3.7 m high, plus kitchen, storerooms &c, and a number of smaller structures. It was said to have been commissioned by one Seymour, who was going to Australia to settle, accompanied by Bielefeld's son.⁶⁹ The construction was based upon a further patent which Bielefeld had obtained in 1853,⁷⁰ and involved timber framing with papier mâché lining, and initially with galvanised iron over the exterior surfaces, though this was later found

⁶¹ Papworth, *Dictionary of Architecture*, sv Fibrous Slab.

⁶² *Sydney Morning Herald*, 13 June 1837. Apparently also 5 June 1837, as cited by James Broadbent, *The Australian Colonial House* (Sydney 1997), p 299 n 113.

⁶³ Broadbent, *The Australian Colonial House*, p 284 and p 298 n 86. Broadbent cites Robert Scott to Helenus Scott, 4 May 1840, in the Scott Family Papers, Mitchell Library, and points out that Scott's sketch of how to apply the mouldings closely resembles that in C F Bielefeld, *On the Use of the Improved Papier-Mâché in Furniture, in the Interior Decoration of Buildings, and in Works of Art* (no date [c 1835]), p 8.

⁶⁴ Broadbent, *The Australian Colonial House*, p 219. Broadbent (note 131, p 235) identifies the drawing room cove ornaments with the 'leaf enrichments', no 479, in plate 130 of Bielefeld's catalogue.

⁶⁵ Broadbent, 'Aspects of Domestic Architecture', II, p 436, quoting Mitchell's diary for 1843-6, Mitchell Library ms C61, entry for 16 April 1844.

⁶⁶ Nearly all the papier mâché can be found in Bielefeld's catalogue: hall centre flower - pl 45 top; ceiling band - pl 126 no 366; cornice - pl 94; drawing room ceiling band - pl 115 no 196; corner - pl 94; cornice - pl 128 no 395; dining room centre flower - pl 57 (without extra border); ceiling and - pl 127 no 370; corner - pl 94; cornice - pl 96.

⁶⁷ A centre flower of coarse radiating leaves which resembles patterns by Bielefeld, but is not an exact match to any in his catalogue.

⁶⁸ *Household Words*, no 87 (22 November 1851), pp 210, 213.

⁶⁹ *Illustrated London News*, XXIII, 630 (6 August 1853), p 80.

⁷⁰ *Builder*, XI, 535 (7 May 1853), p 299.

unnecessary, and was discontinued.⁷¹ Bielefeld's *Portable Buildings*⁷² illustrates some of these structures together with some others, such as a papier mâché church, which were probably destined elsewhere. Whether the village, Seymour, or Bielefeld junior, reached Australia is no clear, but we know that at least two papier mâché buildings by Bielefeld were built in Geelong,⁷³ and two other papier mâché houses, probably his, in East Melbourne.⁷⁴ At the Melbourne Exhibition of 1854 there were shown 'Patent Composition Boards, suitable for roofing, lining, &c, and adapted to the colony',⁷⁵ which sound suspiciously like the unused components of papier mâché houses.

'Corio Villa', Geelong, a very substantial cast iron house made by Robertson & Lister of Glasgow in about 1853-4, arrived with papier mâché ceilings, which were probably made in Scotland (somewhat unusually).⁷⁶ At 'Wood Cot Park' in Gippsland, of 1854-5 (a wooden house, but probably also prefabricated), the survives a delightful papier mâché centre flower in the form of radiating acanthus leaves with the ends curling downwards, some twisted to one side or the other, as if whipped in the breeze. Although it appears to be smaller in size, it accords with Bielefeld's design no 278.⁷⁷ A similar papier mâché centre flower is found at 'Werai' homestead, near Deniliquin, New South Wales, which was designed in 1858 by the Melbourne architects Crouch & Wilson. 'Greenoaks' in Sydney of 1856-7, designed by Edmund Blacket, had a ribbed papier mâché ceiling,⁷⁸ and there must be many other examples which have not been documented, or which have been mistaken for plaster. The papier mâché cornice of the drawing room at 'Woolmers', Tasmania, was bought from Jackson & Son of London in 1859.⁷⁹

In 1857 the Melbourne ironmongers P Langwill & Co, were advertising papier mâché tables, chairs, work boxes and dressing cases, but no architectural ornaments.⁸⁰ However, in 1858 Edmund Westby & Co advertised 'ENRICHMENTS for Ceilings, &c, - Bielefeld's Papier Mâché Enrichments consisting of mouldings for cornices, flowers for ceilings, and trusses for shop fronts, moulded in high relief, and superior to plaster in every respect.'⁸¹ They were advertising similar products, now 'at lower

⁷¹ *The Era*, 10 July 1853, quoted in Bielefeld, *Portable Buildings*, op cit.

⁷² Bielefeld, *Portable Buildings*, op cit.

⁷³ Peter Alsop, address to the Institution of Engineers, 17 July 1979.

⁷⁴ Winston Burchett, *East Melbourne 1837-1977* (Melbourne 1978), p 161.

⁷⁵ Shown by Dundas, Gunn & Co. *Official Catalogue of the Melbourne Exhibition, 1854* (Melbourne 1854), p 11

⁷⁶ Charles D Young & Co, *Illustrations of Iron Structures for Home and Abroad, consisting of Stores, Dwelling-houses, Markets, Arcades, Railway Stations, and Roofing, &c. &c., constructed of Wrought and Cast Iron and Corrugated Sheets, Manufactured by Charles D. Young & Co.* (Edinburgh, no date c 1856), p 4.

⁷⁷ Bielefeld, *Improved Papier-Mâché*, p 55, no 278. See also p 30, ceiling no 619. The other centre flower in the house, which has lost its outermost ring of ornament, is probably also of papier mâché, though no match can be seen in Bielefeld's catalogue.

⁷⁸ Maisie Stapleton [ed], *Historic Interiors* (Sydney 1987), cited in Anne Neale & Suzanne Dance, *Glenfern, 417 Inkerman Street, East St Kilda, Conservation Analysis* (no place, 1986), p 146.

⁷⁹ Clive Lucas, *Australian Country Houses: Homesteads, Farmsteads, and Rural Retreats* (Sydney 1987), p 146.

⁸⁰ *Australian Builder*, 10 (7 May 1856), p 78.

⁸¹ *Geelong Advertiser*, 18 March 1858, p 1.

prices than plaster work', in 1859.⁸² A curious aside is the fact that C H Ebdon, a member of the Victorian Legislative Assembly's Select Committee on the Melbourne and St Kilda Railway, pushed the merits of papier mâché as manufactured by 'that man near Windsor, Beilfield [*sic*]' for first class railway carriages. Though he mentioned that houses were also built of the material, he gave no indication that he knew of such structures in Melbourne.⁸³

Papier mâché cannot have been much used in Australia beyond the 1850s, as local modellers and tradesman became more skilled, and the technique of cannabic or (hemp-reinforced) plaster developed to drive it out of the market. In 1866, however, William Coote arranged the importation of twenty-eight cases of carton pierre mouldings for the Brisbane Town Hall, though they proved to be unusable.⁸⁴ The 1881 wing of 'St Andrew's House' in Kingston Terrace and Stanley Street, North Adelaide, is another exception, for it is reported to have a loft ceiling with both flat panels and ornamental work in papier mâché.⁸⁵ In 1887 the chamber of Parliament House, Adelaide, had a panelled ceiling containing papier mâché enrichments which were perforated where required for ventilation purposes.⁸⁶

The Papier Maché [*sic*] Company of London showed 'decorative work'; at the Sydney Exhibition of 1879,⁸⁷ and, as the Plastic Decoration Co, various items at the Adelaide Jubilee Exhibition of 1887.⁸⁸ At the Centennial Exhibition in Melbourne in 1888-9, as the Plastic Decoration and Papier Maché Co, they showed capitals and pedestals.⁸⁹ At the latter G Jackson & Co also of London showed their carton pierre.⁹⁰ In England 'panel boards of papier mache for interior work' were being used as late as 1907 by the Wire Wove Roofing Co for their industrialised and prefabricated buildings.⁹¹ In 1950 G Jackson & Sons, as the firm had become, were still advertising carton pierre and composition enrichments, in addition to fibrous plaster and other products.⁹²

e. tarred paper and pasteboard

In the eighteenth century a combination of cardboard and asphalt which became known as *carton pierre*, *steinpappe*, or stone pasteboard, was developed by a Dr Faxe

⁸² C B Mayes, *The Victorian Contractor's and Builder's Price-Book* (Melbourne 1859), p A.

⁸³ Victoria, *Votes & Proceedings of the Legislative Assembly 1856-7*, vol 3, 'Report of the Select Committee on the Melbourne and St Kilda Railway Bill and the St Kilda and Brighton Railway Bill', p 12.

⁸⁴ Donald Watson & Judith McKay, *Queensland Architects of the 19th Century* (Brisbane 1994), p 41.

⁸⁵ Information from John Hoysted, 1991.

⁸⁶ *Australasian Builder & Contractor's News*, 3 December 1887, p 489.

⁸⁷ Sydney Exhibition 1879, *Catalogue of British Section*, p 101.

⁸⁸ *Australasian Ironmonger*, 12 December 1887, p 263.

⁸⁹ Centennial Exhibition 1888-1889, *Official Record*, pp 459, 729, 962.

⁹⁰ Centennial Exhibition 1888-1889, *Official Record*, p 443.

⁹¹ J E Sears [ed], *The Architects' Compendium and Catalogue* (21st ed, London 1907), p 291.

⁹² Evelyn Drury et al [eds], *Architects', Builders' and Civil Engineers' Reference Book* (London 1950), p 113.

of the Swedish Navy,⁹³ apparently at Karlskrona.⁹⁴ It seems to have become quite a common material for roofing houses in Norway, Sweden⁹⁵ and Russia.⁹⁶ At Uleåborg in Finland, after a disastrous fire, the largest houses were rebuilt with paper roofs as flat as possible. Prior to use the paper was drenched in a tar, to which rosin and red ochre had been added. The rafters were 0.9 metres apart, and were sarked with half inch [213 mm] boarding, over which was laid the paper, with 50 mm overlaps nailed at 130 mm intervals and smeared with tar. The surface was then covered with 'comp. meal' consisting of brick dust, smithy dross and sand, trodden into place. A year later it was smeared with tar and strewn with meal again, and once again a year or two after that.⁹⁷

In England there is an occasional sixteenth century reference which seems to suggest that paper was in use for the walls of labourers' cottages,⁹⁸ but the earliest specifically identifiable uses in Britain are in the eighteenth century. At Witton House in Norfolk the riding house had a paper roof which was blown down on New Year's Day, 1779,⁹⁹ and a church at Dunfermline, built in about 1750, had a roof of brown paper coated in tar, which was given a new coat of tar every six or seven years.¹⁰⁰ It was still in sound condition when J C Loudon wrote of it sixty years later.¹⁰¹ This may well have been made from the tarred paper manufactured in England by Sir James Wright, for this material was made use of in the West Indies when shingles were hard to obtain during the American War of Independence.¹⁰² A similar material was made from at least 1786 by Henry Cook of Woodford Bridge, whose published catalogue refers back to the West Indies connection.¹⁰³ In 1778 Cook patented his 'composition to be used as a substitute for lead, slates or tiles in covering churches, houses, and all other buildings'.¹⁰⁴ Another such product, still available in England in the early

⁹³ Peter Behrendt, *Modern Fireproof and Watertight Building Materials* (Melbourne 1883: originally read to the Royal Society of Victoria, 10 May 1883), pp 1-2. Behrendt erroneously gives it as *carbon de pierre*.

⁹⁴ Papworth, *Dictionary of Architecture*, sv Cartonpierre, refers to 'Carlsrona'.

⁹⁵ Joseph Gwilt [ed Wyatt Papworth], *An Encyclopaedia of Architecture* (London 1888 [1842]), p 710.

⁹⁶ Papworth, *Dictionary of Architecture*, sv Slate, Artificial, refers to a board used in Russia, Sweden and Norway, described in the *Mechanic's Magazine*, 1824.

⁹⁷ Papworth, *Dictionary of Architecture*, sv Paper, citing a communication from Christiana [Oslo] in 1857.

⁹⁸ Airs, 'Paper Roofs', p 3, cites a poem of 1573 by Edward de Vere, Earl of Oxford, called 'The Labouring Man that tills the Fertile Soil', which refers to a mason's cottage as 'compact in paper walls, and not with brick or stone as others be'.

⁹⁹ Papworth, *Dictionary of Architecture*, sv Paper.

¹⁰⁰ Robert Beatson, 'On Cottages', in Board of Agriculture [London], *Communications* (London 1804 [1797]), p 111. Beatson refers to a 'particular account' of the method in *Practical Treatise on Rural Improvements*.

¹⁰¹ J C Loudon, *An Account of the Paper Roofs used at Tew Lodge, Oxon* (2nd ed, London 1811 [1810]), cited in Airs, 'Paper Roofs', p 6.

¹⁰² J B Papworth, *Rural Residences* (London 1818), p 36.

¹⁰³ Charles Wood, *Catalogue 112* (Cambridge [Massachusetts] 2002), p 56: notes on [Henry Cook], *Patent Artificial Slate Manufacture, Woodford Bridge, Essex, for Covering Roofs, Fronts of Houses, and Ricks, also Water Pipes and Gutters* (London, no date [c 1786]). The book is again described in Catalogue 117 of 2003, pp 11-12, and the title page reproduced on p 13.

¹⁰⁴ Bennert Woodcroft, *Author Index of Patents of Inventions* (1857), cited in Eileen Harris], *British Architectural Books and Writers 1556-1785* (Cambridge 1990), p 412. Harris also lists patents for imitation slate, &c, but it is unclear whether any were paper based.

nineteenth century, was made by dipping sheets of coarse paper into tar, and was used like slates for roofing purposes, being nailed either to boarding or to battens, but the surface would be painted over with a mixture of pitch and powdered coal, chalk or brick dust.¹⁰⁵ At Old Longford House, St Helena, where Napoleon was housed by the British:

the roof and ceiling ... was chiefly formed of wood, and covered with brown paper, smeared with a composition of pitch and tar ... the composition, when heated by the rays of the sun, melted and ran off, leaving a number of chinks open, through which the heavy tropical rain entered in torrents.¹⁰⁶

Near Oxford paper making was a significant local industry, and when John Swann made improvements to his paper mill at Wolvercote in about 1799, he roofed part of it in tarred paper. In 1804 he bought the Eynsham mill, and again used paper in its roofing. His brother James Swann, who continued the business after John's death in 1806, seems to have manufactured a paper specifically for roofing purposes, and the Oxford area became one in which paper roofing was used most extensively. It was first promoted by Loudon in a pamphlet *An Account of the Paper Roofs used at Tew Lodge, Oxon* of 1811.¹⁰⁷ The treated paper was said to be very similar to Sir James Wright's material.¹⁰⁸

As Loudon described the roofs in his *Observations on Laying out Farms in the Scotch Style, Adapted to England*, of 1812:

These rafters ... were generally placed from twelve to eighteen inches apart, according to their strength. On these, in a direction from the eaves to the ridge ... were nailed boards, a quarter of an inch thick; and on these were nailed the paper, generally two sheets in thickness, (though one sheet will suffice) the one overlapping the other, in the manner of slating. ... [he describes alternative methods using hurdles or plasterer's laths in place of boards] ...

In preparing the paper, a boiler, three feet wide and two feet deep, must be placed over a furnace, in the open air, and either coal or vegetable tar and pitch put in it, in the proportion of three-fourths of tar to one of pitch. The fire being lighted, as soon as the mixture boils dip the paper in it, sheet by sheet, and afterwards lay it out on a board to drip, putting a little grease of any sort between each sheet, to prevent their adhesion. In a day or two they may be dipped a second time, in a similar mixture, and afterwards, when dry enough to be conveniently handled, they are fit for use. ...

[the paper having been nailed onto the roof] it is next to be coated over with a mixture of tar and pitch, about two parts of tar to one of pitch, thickened with powdered charcoal, and whiting or lime. One coating is sufficient. It is laid on at boiling heat, with a mop; and when it becomes dry and hard it will be found encrusted about an eighth of an inch in thickness, quite smooth, and the joints of the paper and every crevice totally covered. If smithy ashes, forge

¹⁰⁵ Papworth, *Rural Residences*, p 36.

¹⁰⁶ J S C Abbott, *The Life of Napoleon Bonaparte*(London, no date), p 575, quoting Dr O'Meara.

¹⁰⁷ Airs, 'Paper Roofs', passim.

¹⁰⁸ Papworth, *Dictionary of Architecture*, sv Paper.

dust, or sharp sand be strewed over it, while hot, it will not readily catch fire from sparks or flame, nor melt by the heat of the sun.¹⁰⁹

Recent investigations by Dr Malcolm Airs have established that paper roofs were already surprisingly widely used in Loudon's time. They used either the paper made for button manufacturers, or that made by Swann at Eynsham. It was dipped in a cauldron of tar and pitch, dried, and then dipped a second time. Loudon referred to paper roofs as frequent in Scottish farm buildings; used in warehouses at Greenock, Deal, Dover and Canterbury; and, as he soon afterwards discovered, in factories in Yorkshire, Hertfordshire and elsewhere. They were becoming common around Exeter, and were to be found in Canterbury and Dover. However, when the Earl of Buchan used paper roofing on buildings on his estates at Almondale, Linlithgow, it was described as 'a new sort of roofing just invented, paper covered with pitch'. In the decades following Loudon's pamphlets paper was used on giant roofs at the dockyards, constructed so that fighting ships could be built under cover.¹¹⁰

Early in the nineteenth century a Prussian engineer, Büsscher, studied carton pierre or steinpappe roofing in Sweden and Finland, preparatory to establishing a factory in Germany, and subsequently his son's firm of Büsscher & Hoffman marketed this and other asphalt-based products (as did other companies). This carton pierre was used for roofing by placing it over boards, onto which triangular fillets of timber were nailed in parallel, spaced apart the width of one sheet. Sheets of the material were placed in between, narrow strips were fixed over to top of the fillets to give a slight lap, and then fluid asphalt spread over the whole.¹¹¹ In 1850 the Messrs Ebart of Neustadt, Eberswold, Germany, invented another, allegedly incombustible, cartridge paper or stone paper for roofing purposes.¹¹²

In 1859 a Belgian paper manufacturer, Porigneaux, developed a system of saturating 'slabs' of paper with tar, for use in roofing, and it appears that these were successfully used in Greece, whilst in Belgium itself the government used the material for roofing railway stations and powder magazines.¹¹³ In France Théodore Chateau names Chameroy & Cie's *toiles cartonnées et bitumées*, or papered and bitumenised cloth, and the Didier-Letacq roofing, now made by Ernest Letacq, which seems to have been either a cloth or a paper, bitumenised and sanded.¹¹⁴ P Desfeux, of Paris and Billancourt, made 'leather paper' [carton-cuir] and bitumenised paper, both usually finished with sand. The leather paper was used especially for roofing, but also as a wall finish, and in both cases laid over boarding. The firm had been founded in 1855, and the indications are that it was producing such materials from the outset.¹¹⁵

¹⁰⁹ J C Loudon, *Observations on Laying out Farms in the Scotch Style, Adapted to England, adapted to England, &c* (London 1812), pp 42-5.

¹¹⁰ Airs, 'Paper Roofs', passim.

¹¹¹ Behrendt, *Modern Fireproof and Watertight Building Materials*, pp 1-2.

¹¹² Papworth, *Dictionary of Architecture*, sv Stone Paper.

¹¹³ Papworth, *Dictionary of Architecture*, sv Paper.

¹¹⁴ Théodore Chateau, *Technologie du Bâtiment* (2 vols, Paris, 1863, 1866), II, p 316.

¹¹⁵ P Desfeux, *Carton-Cuir pour toitures et au Carton Bitumé* (Paris 1888), passim.

There seems to have been a distinct tradition of non-bituminous cardboard or 'artificial slate' for roofing, described as 'a strong fibrous kind of cardboard made from old ropes, and covered with metallic cement, to a great extent waterproof and fireproof'. According to Papworth it was invented by de Ruolz, and was in wide use in France in about 1858.¹¹⁶ A 'mineral pasteboard', presumably not based upon asphalt, was developed by Maillard & Cie of Paris in the 1860s.¹¹⁷ A paper house developed in England in the 1860s by Szerelmy,¹¹⁸ probably used the silicate-based waterproofing compound of which he was the inventor, and in 1867 Szerelmy was reported to have made at the Albion Works, Battersea, paper water tanks, pipes and coffins as well.¹¹⁹

By 1868 paper tiles were being made at Chemnitz in Saxony, and had been taken up by the government for roofing a variety of mainly temporary buildings.¹²⁰ Another such material was made by Julius Erichsen and Co of Copenhagen for some years before being introduced in England in 1870 as the 'Anglo-Danish Patent Asphalte Roofing Pasteboard'. It was tested for fire resistance at Ransome's Patent Concrete Stone Company premises, East Greenwich, and then marketed by the London timber merchants H Atkinson & Co. The pasteboard was laid over timber boarding, which might be pitched as low as 1 in 8. The surface was to be coated in asphalt mastic and immediately sanded.¹²¹

In 1861 tarred paper was recommended as something which the Australian settler could make for himself:

a very cheap [roofing] may be made by dipping sheets of waste paper into boiling tar and nailing them on boards, or laths, in the same manner as slates. The whole is then painted over with a mixture of pitch and powdered coal, or brick dust. This forms a texture which completely resists all kinds of weather for a length of time, without requiring repairs.¹²²

In the United States Samuel D Warren of Cincinnati started a business in 1844 covering flat roofing with paper and pine tar. To soften the pine tar he tried adding coal tar, with such success that he soon began using coal tar alone.¹²³

f. sheathing paper

Tarred sheathing paper, which was quite widely used as a roofing material at Cape Town by the 1820s, seems to have been similar to the English paper tiles, and was

¹¹⁶ Papworth, *Dictionary of Architecture*, sv Slate, Artificial, referring to 'Roofing Paper and Wood Cement in North Germany', *Transactions of the Royal Institute of British Architects*, 1885, pp 103-4.

¹¹⁷ Papworth, *Dictionary of Architecture*, sv Pasteboard, ref *Building News*, XV, 226 (1868).

¹¹⁸ Papworth, *Dictionary of Architecture*, sv Paper, ref *Morning Post*, 8 September 1864.

¹¹⁹ *McIvor Times*, 4 January 1867.

¹²⁰ Papworth, *Dictionary of Architecture*, sv Paper, ref *Building News*, XVI, 103 (1869).

¹²¹ [Francis Young], *Every Man His Own Mechanic* (London, no date [c 1882]), pp 624-7. See also Papworth, *Dictionary of Architecture*, sv Pasteboard.

¹²² *Australian Settler's Hand Book: the Farm, being Practical Hints, &c* (Sydney 1861), p 7.

¹²³ James McCawley, *Roofing* (New York 1938), p 16.

most likely imported from England. It came in flat sheets rather than rolls, and was coated twice with pitch and tar after laying.¹²⁴ It was mentioned as 'sheathing paper' when used for roofing at Robben Island in 1826, and in about 1831 was recommended for use on the Anglican church at Port Elizabeth as 'roofing paper, manufactured expressly for that purpose in England [which] has been found to have resisted the influence of the weather during a period of 30 years.' In 1835 George Gilbert proposed it for the roof of his fortified farmhouse, on the grounds that it was 'more easy of being kept in repair.'¹²⁵

It seems to have been in the 1870s that an American paper for building purposes was tested in Chicago and used to clad specimen houses.¹²⁶ An Australian report of 1878 refers to an American paper, probably the same one, which had been used to construct houses: it came in a 52 foot [15.6 m] wide [sic] roll of 25 lb to 100 lb weight, withstood climatic conditions, and burnt less readily than wood.¹²⁷ Tarred paper designed specially for the purpose seems to have been in common use in United States and was published even in an Australian farm manual of 1885, adapted from an American source.¹²⁸ An alternative sheathing paper appears to be Neponset, which by 1890 was marketed by the National Sheet Metal as 'cheaper and better than tarred paper'.¹²⁹

In 1916 the Agasote company of Trenton, New Jersey, which had previously produced a wood fibre board, began making 'Homasote' from recycled newsprint, which was pulped, combined with petroleum wax, and pressed into hard panels. So successful was it that the makers ultimately changed their name to the Homasote Company, and this company still manufactures the material at Trenton today.¹³⁰ This was perhaps more a board than a paper, but a lighter alternative was the 'Red Rosin Sized Sheathing', which was claimed in a catalogue of 1925 to have been standard for years and well-known to builders throughout the United states. It consisted of what was described as 'a strong tough body paper, resin sized on both sides.'¹³¹

In Canada, at least by about 1910, standard construction required at least two layers of boarding with tarred paper in between, while occasionally the outer layer of boarding was omitted and a single or double layer of tarred paper exposed to the

¹²⁴ Ronald Lewcock, *Early Nineteenth Century Architecture in South Africa* (Cape Town 1963), p 385

¹²⁵ Lewcock, *Architecture in South Africa*, p 321.

¹²⁶ A house of 22 x 16 x 14 feet high [6.6 x 4.8 x 4.2 m] was reportedly completed for less than \$9, one of 16 x 22 x 20 feet [4.8 x 6.6 x 6 m] for \$20. Papworth, *Dictionary of Architecture*, sv Paper, ref 'Paper as a Building Material', *Building News*, XXII, 241 (1872), taken in turn from *Engineering*.

¹²⁷ *South Australian Record*, 20 November 1878, quoted in E & R Jensen, *Colonial Architecture in South Australia* (Adelaide 1980), p 577.

¹²⁸ Jonathan Periam [adapted by R W E McIvor], *The Pictorial Home and Farm Manual* (Sydney 1885), p 273.

¹²⁹ National Sheet Metal Roofing Co, *Practical Hints to Builders* (New York 1890), pp 47, 99.

¹³⁰ K C Milley, 'Homasote: the "Greatest Advance in 300 Years of Building Construction"', *APT Bulletin*, XXXVII, 2-3 (1997), p 58.

¹³¹ Chicago Millwork Supply Co, *Millwork and Building Material* (Chicago, no date [c 1925]), p 50.

weather.¹³² However such materials are scarcely known in practice in nineteenth century Australia, except in the special case of Willesden paper.

gk Willesden Paper

In 1870 the Willesden Paper and Canvas Works was established in the eponymous London suburb,¹³³ and this seems to have been the first type to have a significant impact in Australia. In 1881 a shelter of hessian and tarred paper - apparently Willesden paper - was built as a staging post to accommodate the Governor of Victoria, Sir Henry Brougham Loch, on a visit to the Mount Buffalo Plateau.¹³⁴ In 1885 a small demonstration house of this material was put up on the Yarra bank at Melbourne.¹³⁵ In 1886 the material was shown at the Scientific and Mechanical Exhibition in Sydney by Edwards, Dunlop & Co, and at that time was said to be rapidly becoming popular.¹³⁶ In 1887 it was advertised in J E M Vincent's *The Australian Irrigation Colonies*, with illustrations of the soldiers' recreation rooms at Assouan and Korosko in Egypt, which were built of the material, and a reference to 'rot-proof tents', doubtless of Willesden cloth, supplied to the Victorian government.¹³⁷

In 1888 an 'office' built of Willesden paper was shown at the Centennial Exhibition, Melbourne,¹³⁸ and it seems probable that another exhibit, 'a portable house, made of paper, on a wooden framework',¹³⁹ was of a similar material. The use of Willesden paper in 1890 to create an insulating double roof at E H T Plant's house in Charters Towers, Queensland, has been mentioned above, and at Wyndham in Western Australia it was laid above the ceiling boarding of the police quarters of 1896-7.¹⁴⁰ Generally Willesden paper was not seen as an exterior wall cladding material, but as a roofing underlay, interior lining, or a finish for damp walls,¹⁴¹ and it came to be favoured in Britain, and probably Australia, in the construction of the walls and ceilings of ice houses and cool stores.¹⁴² It was still being sold in Britain in 1936 for such limited purposes as insulation, and sarking underneath roofing slates.¹⁴³

¹³² G E Mills, *Buying Wood and Building Farms* (Ottawa 1991), p 43 and illustration p 45.

¹³³ J E Sears [ed], *The Contractors,' Merchants,' and Estate Managers' Compendium and Catalogue* (15th ed, London 1901), p 76.

¹³⁴ Allom Lovell Sanderson Pty Ltd, *Mount Buffalo Chalet: a Brief History* (Melbourne 1986), p 2, describe the structure as being of tarred paper and hessian, and cite as their sources H Stephenson, *Skiing in the High Plains* (1982), p 70, and J F Wilkinson, *The Romance of Mt Buffalo* (1956), p 4. Jane Lennon has said that the material was Willesden paper.

¹³⁵ *The Record*, 15 August 1885, p 3.

¹³⁶ *Australasian Ironmonger*, 1 October 1886, p 165.

¹³⁷ J E M Vincent, *The Australian Irrigation Colonies* (London, no date [1887]), p 38.

¹³⁸ Centennial Exhibition 1888-1889, *Official Record*, p 460.

¹³⁹ Shown by O Allport of London: Centennial Exhibition 1888-1889, *Official Record*, p 465.

¹⁴⁰ Ray & John Oldham, *George Temple-Poole* (Nedlands [WA] 1980), p 164.

¹⁴¹ Joseph Gwilt [revised Wyatt Papworth], *Encyclopaedia of Architecture* (London 1897 [1842]), p 677, §2210g.

¹⁴² A J Wallis-Taylor, *Refrigeration, Cold Storage and Ice-Making* (London 1902), pp 319, 323.

¹⁴³ J E Sears & J E Sears, *The Architects' Compendium and Annual Catalogue* (London 1936), p 108.

Willesden Paper was far from being the only product of this type. A material consisting of two layers of paper with waterproof bitumen or asphalt cement between was patented in the United States in 1887. It was marketed as O.K. building paper by the company W H H Childs.¹⁴⁴ In the 1890s Neponset Roofing Fabric was available in the United States and was said to be a heavy strong paper, chemically treated but free from coal tar. It was common to use a 'two-ply' sheet with Red Rope Roofing Fabric as the upper layer, and the lower layer either the same, or of the cheaper Neponset Sheathing Paper.¹⁴⁵ In the early twentieth century Sears Roebuck were marketing a range of red rosin sized building papers branded, in increasing order of weight, 'Competition', 'Acme', 'Leader', and 'Fulton'.¹⁴⁶

By the 1930s other products were competing strongly in Australia itself. 'Ormonoid' was being marketed and possibly manufactured in locally.¹⁴⁷ 'S.K.' board was a waterproof building board, apparently based upon bitumen, available on 1938 in a nine-ply thickness suitable for ceilings, and an eighteen-ply 'rigid and waterproof' version for walling.¹⁴⁸ 'Sisal-Kraft' (the hyphen was soon to disappear) was being advertised in New Zealand in 1897. it was described as being reinforced with flax fibres in two directions, embedded in layers of bitumen.¹⁴⁹ 'Sisalkraft' was claimed to be in use throughout the world, and by 1934 was being manufactured at the Australian Sisalkraft Co Mills, Waterloo, New South Wales, and distributed in Victoria by Henry Berry & Co.¹⁵⁰ In 1956 a Sisalkraft factory was opened at Challa Gardens, South Australia.¹⁵¹ Other kraft papers seem to have been Langley's 'Waterproof Scutan', and a lighter waxed paper by Waxed Papers Ltd of London. This latter company also produced a waxed manilla paper, and the Ruberoid Co produced two bitumenised manilla rope papers, 'Giant' and 'P & B'.¹⁵²

After World War II Willesden Paper was entirely replaced in Australia by Sisalkraft and similar products, such as 'Jutex', made from kraft paper bonded to hessian with plastic bitumen.¹⁵³ Jutex was advertised as being suitable for lining brick and plaster walls, covering cracks and checking drainpipes, with a neutral colour which was a suitable background for decorative schemes.¹⁵⁴ It was described as a strong crepe kraft bonded to hessian with plastic bitumen, which could be applied by an inexperienced person, using a rubberised solution. It was used for flat and near-flat

144 [? W H H Childs], *The Town & Country Roof* (no place or date [? 1888]), passim.

145 *The Canton Steel Roofing Co* [catalogue] (Canton [Ohio] 1899), p 13.

146 Sears, Roebuck and Co., *Sears, Roebuck Home Builder's Catalog* (New York 1990 [Chicago 1910]), p 142.

147 C E Mayes, *The Australian Builders and Contractors' Price Book* (10th ed, Sydney 1938), p 167.

148 Mayes, *Australian Builders' Price Book* (1938), p 29.

149 *Building Progress* [Auckland], II, 5 (Wellington edition, May 1937), p 8. In a report on the preceding page it is spelled 'Sisalcraft'. See also William Kinniburgh, *Dictionary of Building Materials* (London 1966), p 240.

150 W L Richardson [ed], *Ramsay's Architectural and Engineering Specifications [Volume 1]* (Melbourne, no date [1934]), p 35; Mayes, *Australian Builders Price Book* (1938), advertisement p 14.

151 *Cross-Section*, no 46 (1 August 1956), p 2.

152 Drury, *Architects' Reference Book* (1950), p 213. British Sisalkraft Ltd was distributing its product solely through J H Sankey & Sons of London.

153 Peter Cuffley, *Australian Houses of the Forties and Fifties* (Knoxfield [Victoria] 1993), p 85.

154 *Australian Home Builder*, August 1947, p 45.

roofs and for cladding farm buildings, while a lighter grade could be used as a lining for holiday houses.¹⁵⁵ Another internal lining used in Britain was 'Essex Board', which was not bitumenised or otherwise treated.¹⁵⁶ In Australia Rubanit roofing were by the 1950s making a bitumen laminated aluminium building paper, and a similar board, under the brand 'Thermostop'.¹⁵⁷ Generally the popularity of kraft and similar papers declined somewhat after World War II, as plastic substances were introduced. ICI began manufacturing polythene plastic sheeting for sarking and other building purposes,¹⁵⁸ and it was generally easier to form a completely waterproof layer using this.

¹⁵⁵ The suppliers were A Abrahams & Sons Pty Ltd, of Fitzroy, Melbourne, and Alexandria, Sydney: *Australian Home Beautiful*, XXVI, 9 (September 1947), p 52.

¹⁵⁶ S O Adshead, *Modern Methods of Building* [lecture to the RIBA 1936] (London 1937), pp 9-10.

¹⁵⁷ F W Ware & W L Richardson [eds], *Ramsay's Architectural and Engineering Catalogue* (Melbourne 1954), §26/6.

¹⁵⁸ *Cross-Section*, no 44 (1 June 1956), p 2.