

THE MARSEILLES OR FRENCH PATTERN TILE
IN AUSTRALIA

R.V.J. VARMAN

THE AUSTRALIAN SOCIETY FOR HISTORICAL ARCHAEOLOGY
University of Sydney, N.S.W., 2006.

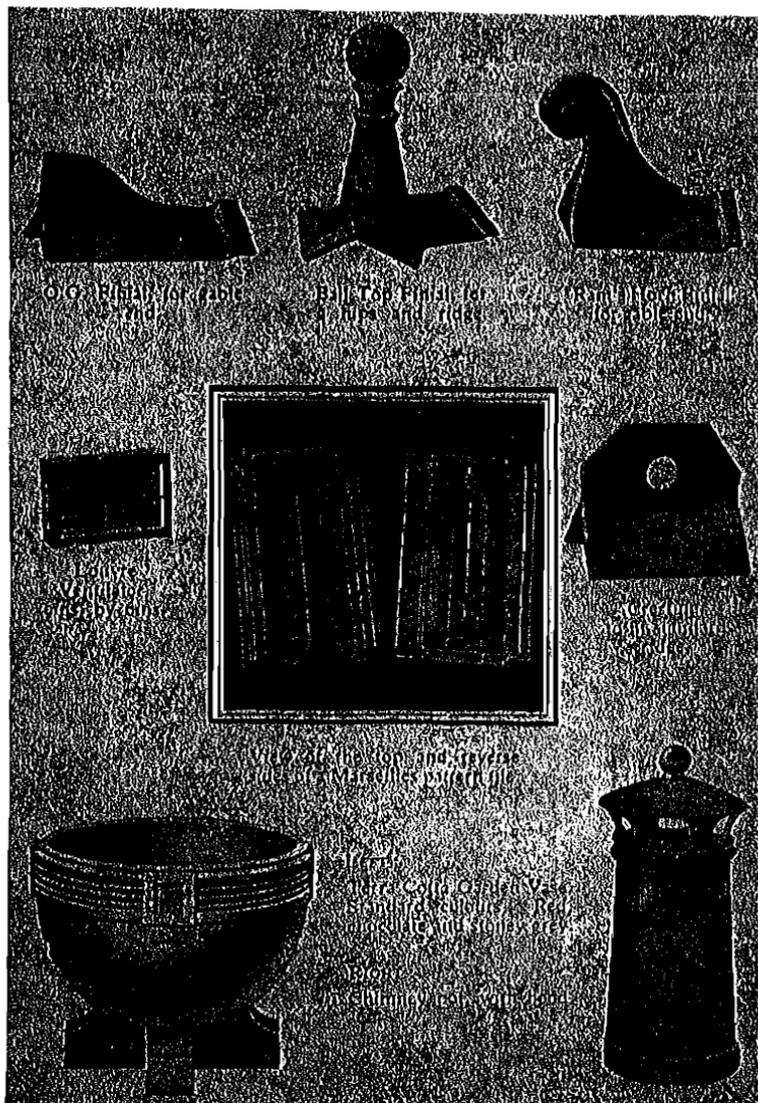
REEL 21817
PAGE 22A

A.S.H.A. Occasional Paper No. 3

(c) Robert Varman and the
Australian Society for Historical
Archaeology.

0 909797-08-0

FRONTISPIECE



TYPICAL PRODUCTS OF THE WUNDERLICH TILERIES.

The Roofing Tiles are available in shades of red, chocolate, buff, brindle, and blended colours.

THE MARSEILLES OR FRENCH PATTERN TILE

The type of tile which is now under examination I prefer to call the Marseilles tile. This is in preference to the term French pattern. Such terms have been used interchangeably since the late C19th. The French pattern tile was a tile originally developed by the Gilardoni brothers in 1851. This tile was developed by them into other sorts, though using the same principal, and from there they were developed regionally. One of the most famous of these regional developments occurred at Marseilles, hence the Marseilles tile. (What I am saying is that all Marseilles tiles of the Gilardoni type are French pattern tiles, but not all French tiles are Marseilles tiles).

BACKGROUND OF THE MARSEILLES TILE IN FRANCE

The prototype of the Marseilles tile was invented by the Gilardoni brothers of Altkirch in Alsace. (1) These tiles were 'fitting' tiles and presented an improvement over the then contemporary tiles which had remained unchanged since the C15th. (2) The fitting tiles were divided into two classes according to the manner in which they were laid upon roofs; the vertical interrupted join was laid with the vertical join alternatively interrupted, similar to the effect of common bonding in brick work; the type of the vertical continuous join was laid with the vertical join in a continuous uninterrupted straight line.

The few sources available in Australia on the Gilardoni brothers provide us with a cloudy picture as to the date of the invention and its exact nature. The Gilardoni frères erected their first factory in 1835. McIntyre & Zaiman claim that they took out the first patent on the interlocking tile in 1841. (3) Lefèvre & Bourry name 1851 as the year of the invention of the interlocking tile. Lefèvre in his work mentions that this was the year during which the patent was taken out on the first machine to produce the tile. Either way further investigation must be made, as the fitting tile cannot be made by hand such as the Roman or Flemish tile, the fitting tile needs metal or plaster dies and at least hand press machinery for production. Provisionally I prefer to accept the 1851 date according to Lefèvre & Bourry's account.

Of the two basic types of interlocking tile I shall take up the development of the vertical interrupted join variety, for from this type developed the tile known as the Marseilles tile, and it belongs to that order of tile.

The earliest type of interrupted vertical join fitting tile that I have been able to trace is the Gilardoni No.1 or lozenge tile. (see fig.1) The average dimensions of this tile are 15.3/4" x 8.4" (4) When the patent expired on the Gilardoni No.1 tile it was copied, with minor alterations to the basic principal, "by many firms". (5) Non-functional details such as surface decoration, minor displacements of functional details also occurred resulting in ever changing varieties of the tile, deplored by Lefèvre, but none the less providing future archaeologists with a greater opportunity to establish a workable morphological framework.

THE IMPORTATION OF THE MARSEILLES
TILE INTO AUSTRALASIA

Some of the anomalies that have arisen out of the question of who imported the first tiles, or when they were first imported, may be explained by confusion over nomenclature, (touched on above), the blame for this must be awarded to the modern authors on architectural topics. The greater part of the confusion, however, should be blamed on the egotistical and consistent claims made by various individuals belonging in building and architectural circles.

Boyd and Freeland in their works on Australian architecture come out with the surprising proposal that old bundles of Marseilles tiles arrived at Sydney and Melbourne during the 1850's (11) . This tile is said to have failed to gain a market, along with attempts to locally produce terra cotta roofing tiles, because of high costs and conservatism - the grey tile and the shingle were currently fashionable, and because of the heaviness of the tile. I have endeavoured in vain to trace the source of the claim that odd bundles were introduced during the 1850's. Dr. Errey of Melbourne in her thesis passes over this part of Freeland & Boyd's information by stating that the Marseilles tile's first introduction as ballast "has a tenacious hold on verbal accounts". (12) There is no data in the Victorian Blue Books of the 1850's on roofing tiles, information, however, is given on bricks imported, (keeping in mind that the cities listed may merely have signified the last port of call), for example, the Blue Book for 1859 mentions imports of bricks from the U.K., Amsterdam, Guttenberg, Hamburg, Marseilles..." etc.

The next date mentioned by Boyd & Freeland is 1886. This date has not been disputed, (13) nor do I dispute it, though I would like to correct two misleading statements made by Boyd. Boyd claims that in that year the Marseille tile arrived "in quantity" (14) which it didn't. Boyd also mentions that after the 1886 imports Wunderlich "immediately began manufacturing "Marseilles tiles" in Melbourne (15), his computation is premature by about thirty years.

Before discussing the importation of the tile during the 1880's and onwards I would like to emphasise the unlikelihood of it being imported during the 1850's. The prototype of the tile, the Gilardoni No.1 was not invented until 1851 and a patent was taken out on it thus preventing other works using the principle until the patent lapsed. When it did other French works, including some at Marseilles, began to produce the Gilardoni or lozenge tile, and then developed their own versions. It seems unlikely that all of this happened in a couple of years for it to be ready for export, by ballast or otherwise, to the Australian colonies in the 1850's.

Bourry in the 1901 English translation states:

"In 1851 Gilardoni invented a new system of tiles, WHICH IS GRADUALLY SUPPLANTING, except in some special positions, the tiles from the Roman and the flat tiles". (16)

This indicates that even in France the change over from the traditional orders of tiles was a slow and gradual process. I am drawing towards the conclusion that tiles imported before the 1880's were most likely of the traditional Roman, Flemish or flat terra cotta tile types. If they were called Marseilles tiles it was because they originated from there and the name meant generically.

It appears that the patent on the Gilardoni tile must have expired towards the end of the 1860's. In 1869 a French patent was reportedly at work in Sydney, (17) and in 1871 J.B. Hughes of Terre Haute Indiana U.S.A. took out a patent for an interlocking tile and machine for manufacturing it. (18)

The Marseilles tile cannot have made much of an impact even during the second half of the 1880's. Commenting on Australian architecture in 1887, Salmon stated, "Slates and iron are our roofing, in lieu of heavy Roman tiles". (19) Also in 1887 the ABCN comments on the topic of roofing, that for drinking water and durability the following types of roofing are advised in the following order, slates, iron and shingles; for appearance, shingles, slates and iron. (20) The above indicates that any sort of terra cotta roofing tile was rare, and the mention of "heavy Roman tiles" indicates that this was the form of terra cotta tile known to the colonists.

Boyd and McLean claim that the Marseilles tile was imported to Melbourne in 1886 and that the first tiles appeared on a house in St. Kilda Road. Freeland mentions that the tiles imported in 1886 were imported by Messrs. Roche & Co., and that Walter Lamb brought a small shipment of them to Sydney. (21) Other companies are said to have "elsewhere followed". (22) That the time was right for the importation of the tiles is beyond dispute. The swing was away from the grey roofs of the Italianate to the picturesque of the so-called Queen Anne style where red brick and terra cotta was called for.

The importation of the tiles to Sydney by Walter Lamb was presumably a small one and possibly meant only for his own purposes. He is first listed in the Sands' Directory of 1886 in the alphabetical section as living at "KAMBALA" Bellevue Hill, Watson's Bay. (23)

The firm of W.H. Roche & Co., actually suppliers of furniture, probably were responsible for the first significant imports of the Marseilles tile, though their activities from 1886 to 1890 in this area is fairly obscure.

In 1888 the organization that regulated the distribution of the Marseilles tile, the Société Anonyme of Marseille, received a silver medal at the Melbourne Exhibition for its roofing tiles (24) The display of the tile at the exhibition would have caused a fair amount of interest among architects and builders.

1890 seems to be the turning point where the Marseilles tile emerges from obscurity and begins to enjoy almost universal popularity. The company responsible for its promotion in the colonies was Messrs. W.H. Roche & Co. The ABCN of the 14.4.1890 reported:

"After a very great deal of hard fighting to overcome strong colonial prejudices they... are now proving successful in the introduction of French terra cotta roofing tiles".

The report mentioned that "they are already coming under particular favour of Sydney architects". These tiles were being specified for the new Walker's Convalescent Hospital, the new Railway Institute, (unfortunately has been re-roofed in more modern Marseilles type tiles), and for "numerous private dwellings" and that a certain Mr. A.M. Allen's new house at Summer Hill "has recently been covered with these tiles".

Incidentally this report stated that several million tons of "tiles by the manufacturers at Marseilles" have been exported to South America, proving their suitability to the tropical climate.

Issues of such newspapers as the Sydney Illustrated News often show pictures or illustrations of new buildings with the imported tile as roofing. The earliest I have found to date appears in the 28.2.1891 issue of the Sydney Illustrated News, it shows various pictures of the opening of the Bowral & Moss Vale Club. Though not supported by the text, the photographs of the buildings suggest Marseilles tiles and terra cotta accessories. The Sydney Illustrated News of 25.4.1891 has an article and photograph of the newly opened Belgravia Hotel, Medlow, Blue Mountains. The roofing distinctly resembles Marseilles tiling. The text mentioned that the building was composed of red brick tuck pointed and that terra cotta was used for the panels, finials and decorative work of the bay windows etc. The roof was covered with "patent French tiles". The next such reference I found was in the BEJANZ, 18.2.1893 p.65 H.H. Lang's "Wood's Chambers" at Newcastle (built 1892) where, "the roof is covered with terra cotta ventilating tiles imported from France".

W.H. Roche & Co. became the major importers of the tile. In 1890 they arranged with the United Tileries to have regular shipments made to Sydney and to other colonial ports. (25) This continued until the disastrous depression of 1892-93 when the Wunderlich Company took over that and other aspects of W.H. Roche & Co's business in Sydney.

Before dealing with the major importer of the Marseilles tile, the Wunderlich Company, I will briefly cover another claim to firsts.

In 1908 the architect E. Jeaffreson Jackson writing for 'Building' stated:

"I once "took the credit" for endeavouring to improve the appearance of Sydney domestic work by introducing the French tile, which I fancy I was the first to import, using it on my own house at North Sydney" (26)".

Jackson in 1886 appears to live in "Caddell's Cottages", Carabella Street, St. Leonards East. He does not appear in Sand's before this time. In 1888 he is recorded as living in Zahel's Terrace, Miller Street, St. Leonards, and appears to have moved again in 1890. In 1892 he is listed at Jamieson Street. It was probably the house in this street to which he was referring in the above quotation, so we are not compelled to take his statement very seriously.

A brief outline of the early years of the Wunderlich Company should clarify their role in the question of firsts as far as importing the tile is concerned.

In 1885 the first member of the Wunderlich family, Ernest, reached Australia. (27) He is listed in Sands' in 1886 as a "merchant" and in 1887 as a manufacturer's agent at 14 Bond Street. In 1888 he was joined by his brother Alfred and are described as "Agents and Wine & Spirit Merchants" at Underwood Street (Ernest is also listed as living at Upper Bayview Street, Victoria. In 1890 Alfred is at 335 Pitt Street, and Ernest as a "merchant and manufacturing agent" at 10 York Street, he also maintained a business at 492 Kent Street, as a "Zinc Worker".

Forty years of Wunderlich Industry 1887-1927 informs us that in those early years they began by producing ornamental roofing (28) and that a patent was taken out for stamped zinc. (29) In 1893 the Wunderlich Patent Ceiling & Roofing Co.Ltd. was formed (30) The Wunderlichs are not included in Sands' 1891-1893.

The Wunderlich Company was able to lead the industry in stamped metal as they bought out their greatest rival W.H.Rocke & Co. The latter company had evidently gone broke towards the close of 1892. In the first week of January 1893 it was reported that Messrs. W.H. Roche & Co. had sold their business and patent rights "of the above ceilings in N.S.W." (no list given) to Wunderlich. In this deal Roche & Co. had sold their terra cotta department as well. "The terra cotta department will continue in charge of Mr. Alex Knox under whose superintendence the fixing of Marseilles tiles will as heretofore be carried out". Wunderlich promised the public to continue all of W.H. Roche & Co's engagements in both sides of the trade. (31)

That year extensions were made to their factory at Redfern and the company promised to carry out all estimates of every kind of ceilings and roofs in iron, zinc, lead, copper and aluminium. Up to that time they had already treated buildings with metal ceilings and roofs amounting to a value of over 50 thousand pounds.(32)

The nadir of the depression saw the greatest expansion of this company, and patents were taken out on various of their own improvements. In 1894 patents were granted by the Patents Office Sydney for "Improvements in the construction of metal sash bars, and in the means employed for securing the same to suitable framing, applicable to the construction of glass roofs, sky lights, and the like". (33) Later in the year they received official recognition of their expanding endeavour.

Under the following heading in BEJANZ of 26.4.1894, a Prosperous Industry in N.S.W. - Zinc, Ceiling and Roofing, it was reported that the mayor of Sydney W.P. Manning, about 15 aldermen, the town clerk H.J. Daniel and the city architect G. McRae, visited the works at Baptist Street, Redfern. Manning, "... expressed his pleasure at finding such an important industry at work in their midst, the existance of which he had hitherto been in ignorance of". (34)

A list of Wunderlich undertakings given in the article include work done on the Sydney Town Hall, Sydney Hospital and St. James' Church. The article mentioned that skilled artizans had been brought out from Europe by Exnest Wunderlich and "these have in turn, instructed local men". (35)

Sands for 1894 contains an advertisement describing them as the "Wunderlich Patent Ceiling & Roofing Co. Ltd., manufacturers and patentees of zinc ceilings, zinc roofing, and every kind of embossed metal work for architecture, factory and office Baptist Street, Redfern..." (36) It wasn't until 1896 that the Wunderlich company mentioned that they were "importers of French Roofing Tiles, factory and office and tile yarn, Baptist Street, Redfern" (37)

The company had actually dealt with their first batch of Marseilles tiles in 1892. The Wunderlich company presented the circumstances of their first lot of Marseilles tiles as a very singular event. In fact judging from the various accounts by Wunderlich authors one obtains the distinct impression that the Marseilles tile had never touched Australian soil before the great event in 1892.

According to Wunderlich "... the first cargo of tiles from Marseilles was consigned to a Sydney firm, who was unable or unwilling to undertake the financing thereof". Mr. Alfred van Rompaey (the Belgian Consul in Sydney) received cabled instructions to intervene. Van Rompaey was a friend of the Wunderlich family and "placed the sale of this cargo in their hands". Account sales and remittance followed and the shippers were said to be pleased. This event was said to have opened up relations with the Tile Manufacturers at Marseilles and led up to the arrangement of regular shipments. (38)

It should be fairly obvious to which firm Wunderlich was referring "who was unable or unwilling to undertake the financing thereof". Not only had W.H. Rocke & Co. become insolvent in Sydney in the latter half of 1892, it had also become bankrupt in Melbourne during the first few months of 1893. The company was wound up voluntarily under the Companies Act in March 1893 in Melbourne. (39) In Sydney, Rocke & Co. simply sold all their patent rights and their business in metal ceilings and their terra cotta department to Wunderlich. Even the staff that handled the importing and fixing of Marseilles tiles went over to Wunderlich. (40) It should also be clear from their having established a tiling department that regular shipments of the tiles had been the rule since 1890 which was arranged by Rocke & Co.

By 1894 their roofing tile department was well under way. The BEJANZ reported the following :

"Another of the specialities is the Marseilles terra cotta roofing tile, for which the company are SOLE AGENTS, and nearly all of the red roofs in Sydney have been covered by their exertions". (41)

The firm opened up a wharf at Neutral Bay. The first reference that I have found concerning the wharf is in the 1903 edition of Sands' where it mentions the company's "Private Wharf & Tile Depot, Careering Cove, Neutral Bay" (42) Forty years of Wunderlich Industry claims that up to 1914 110 full cargoes were discharged at the wharf, representing 75,000,000 tiles - sufficient for 40,000 houses "of average size". Hence the origin of Wunderlich's frequent phrase that "Wunderlich's have literally "painted the town red" (43) Thus the company allowed itself to take full credit and concluded, "to the Wunderlich brothers belongs the credit of this transformation". (44)

Wunderlich, from the very beginning, claimed to have been the sole agent to the United Tileries, this was reinforced by the report in BEJANZ of 24.5.1894 (45), it was also maintained in most of their advertisements in Sands, building and contractors' news magazines, art and architectural magazines and the newspapers, etc. Even this claim of Wunderlich's I call into question. One finds references that some builders collected their tiles directly from the ship's side. (46) E. Jeaffreson Jackson made his own orders from Marseille. (47) Lastly one finds other companies selling the various Marseilles brands. In Building Australia Maxwell Porter offered the tiles, "French Pattern Tiling we carry this on very extensively". (48)

The importation of the Marseilles tile continued uninterrupted until the outbreak of World War I which caused shipments to cease. The cessation of the imports gave rise to fruitful ground for local production. Wunderlich and a plethora of companies began to produce imitations of the tile on an enormous scale causing a glut. This led to the formation of the Roofing Tiles Limited in 1922, formed somewhat on the same basis as the United Tileries at Marseilles. The Roofing Tiles Limited felt that unrestricted production would cause the closing down of the industry and thus the state would again have to resort to the importation of the tile. Nevertheless the market was still flooded upon the following year (1923). A report was made to the Attorney-General, by the Board of Trade (under the Monopolies Act of 1923) and was published on the 6th of November 1924, concerning the legality of the Roofing Tile Co. From this report I was able to deduce that no significant new imports of Marseilles tiles arrived after the war, indeed, it would not have been in the interest of Wunderlich at all to have imported these tiles considering the over production situation. The price of the imported tile would have been well below that of the colonially produced tile due to high wages in Australia. Builders couldn't import the cheaper tile because of the set up of the Roofing Tile Co. which enabled the company to black ban builders and architects in related areas.

Notwithstanding, Wunderlich is listed in Sands' of 1918 as sole agents for the Marseilles roofing tile (49) though they could not have received any new shipments up to that time. Though they do not mention their wharf at Neutral Bay they claimed to be the sole importers of the tile even up to 1927 in Sands'. They do not mention this fact in their other advertisements.

For general dating purposes I feel that we may grant the imported tile a life span of about twenty four years. A survey of some of the illustrated magazines and newspapers of the 1880's revealed two basic types of roofing; shingles, and slates with metal ridgings, and towards the end of the 1880's terra cotta ridgings became more popular. From 1890 there is a galloping increase in the use of the Marseilles tile which gradually replaced the slate and the shingle. By the time of the building boom of 1908 the foreign tile dominated without serious challenge.

The United Tileries exported about six brands during the 1890's, these were labelled "Bee" "Lion" "Star" "Spade" "Cock" and "Horse". By 1900/1901 two of these brands were no longer being offered for sale leaving only the "Bee", "Lion", "Star" and "Spade" brands. In 1903 the "Spade" brand ceased to be included. By 1907 there were still only three brands being offered for sale.

Provisionally, the following list may be constructed for Marseilles tiles imported to Australasia.

"Cock" & "Horse" Brands	c.1890-1900
"Spade" Brand	c.1890-1903
"Bee", "Lion" & "Star" Brands	c.1890-1914*

Eventually I hope to work out typological sequences within each of these brands. I do not believe that the master template for each of these brands remained unchanged throughout the entire period. I have already found minor differences among members of the same brand but I have not been able as yet to work them into a chronological sequence. The tiles of the "Star" brand, for example, usually have a star moulding on the apex of the obverse of the tile, I have found some belonging to this brand omitting this detail.

* I have to assume for the present that all the above mentioned brands were imported from the start. This is not so unreasonable considering that they were exported by the syndicate of tilers.

COLONIAL MANUFACTURE OF THE MARSEILLES
TYPE TILE

As far as the colonial manufacture of terra cotta tiles is concerned it is well established that they were produced on and off from 1788 or 1789 onwards. The fashion of having grey slate roofs killed off any real incentive to produce terra cotta roofing tiles toward the middle of the C19th in Australia. We know that Joseph Curet was granted a patent for an improved roofing tile at Melbourne in 1859. This patent was sold for 400 pounds to a group of men who floated the Patent Tile Company which produced the first tiles in March 1860. Several factors caused the tile to gain a market. (50) I have no acquaintance with the nature of this tile as yet, though I know that it was used to roof the Museum for Building Materials. (51)

My research covering the decades of the 1860 s and 1870 s are by no means complete. General architectural histories, and a few theses which I have read offer very little assistance. Maye's Australasian Builders Price Book of 1862 revealed that the Phillipstown Brickworks at Melbourne were selling roofing tiles (52) but I have not been able to find out which type they were selling.

The earliest indication that I have been able to find suggesting the possibility of the Marseilles type tile having been produced in Australia I found in the Building Times (Melb.) of the 15th of October 1869 under "trade notes".

"Tiles for Roofing : There have been enquiries for good coloured tiles, but no disposition upon the part of the makers to come forward. We understand that there is a French patent at work in Sydney producing an excellent tile. Surely, with such suitable clay as can be found in the neighbourhood of Melbourne, enterprise will not be wanting and supply an article really wanted". (53)

I have not been able to locate which company it was producing the "French patent" roofing tile. It is possible that it was producing the Gilardoni tile which could also be described as "French patent". Sands' listing of tile-makers starts in 1886 but this list is of little value as it includes under the same heading importers. Tile-makers were generally regarded as those producing wall, paving and ornamental tiles. Sands' lists potteries from 1858-1859 onwards. The few advertisements by potteries list at the most "ridge cappings of all sorts". A Fowler's advertisement in 1868 mentions that they were producing "stoneware paving tiles". It seems that few were producing roofing tiles during the 1850s, 60s and 70s.

Goodlet and Smith may eventually prove to be that company producing the tiles on the French pattern. They were first established at Glebe in 1855 as timber merchants. (54) Sands' 1858-'59 describes them as saw-millers. In 1867 they are listed under "potters", which in 1868 is mentioned as being at Riley St. They were quite progressive for the time having secured the first patent rights for making dry pressed bricks in N.S.W. and were

producing them by about 1873. (55) It is possible that they were experimenting with roofing tiles along with their pottery products in 1868. In 1876 they are listed as "Timber Merchants, Dress Brick & Pottery Manufacturers". It is unfortunate that Goodlet & Smith ran no advertisements in the Directories as did Fowler, Liebentritt, and some of the importers. It seems that this "French patent" did not get off the ground. We do know that Goodlet & Smith began producing Marseilles pattern tiles at their Granville works about 1897, whether they had obtained the patent years before is a matter of speculation at present. From C19th patent indexes there is no mention of it.

There is evidence that terra cotta roofing tiles were being produced but as to the particular type or types remains in doubt.

A. Holroyd of Parramatta received a high recommendation on his roofing and flooring tiles at the Sydney International Exhibition of 1879. Field & Sons, T. and Goodlet & Smith are recorded as having submitted "tiles", probably decorative or paving, the former company having received a first degree of merit. (56) The Victorian and Launceston Steam Pottery Works were producing roofing tiles in 1887. (57) Models for the earlier not-described roofing tiles could have been based on any European roofing tile. In 1887 the residence of C.B. Fairfax of Double Bay was covered with roofing tiles from Messrs. Burton & Sons of Brosely Staff, (58) (probably the same firm that exported "tiles of the Brosely pattern.." which were in 1905 "...on probation now". (59) Other sources tell us of Belgian tiles imported. Thus the tile manufacturer had a number of models to choose from.

In 1890 tiles of colonial production were judged rather primitive, the French tile weighed 700 lbs. per 100 feet ("superficial") and the colonial 1600 lbs. for the same area. (60) G. Blackburn of Mitcham was producing roofing tiles "which he contends cannot be beaten anywhere in the world". Blackburn tried to find a market for them in Sydney but the cost of transport was said to be prohibitive. (61) Another tile being colonially produced was called the "Eureka" tile and was made from the tailings from the old diggings, "clay which has been tempered for years". (62) I have not yet been able to find dates for the last mentioned tile.

The BEJANZ in 1894 reported a visit by architects to the Enfield Brick Co. The object of the visit was to officially start the machinery for the manufacture of "Knox's Improved French Ball-bearing Tiles". The following passage shows that the tile was a modification of the Marseilles type:

"Mr. Knox explained the process and the improvements made upon the imported tiles. There were, he said, 5,000,000 roofing tiles now in use in the colony, but, with the large deposits available, he was sure that the imported article would be driven out of the market, the freight from Marseilles was sufficient protection for the Industry". (63)

It seems that by 1895 there were a number of firms producing the Marseilles type tile. Nangle stated that in "recent years" there had been a great increase of both foreign and colonial made terra cotta tiles. (64) We know that he was referring to

colonial copies because he noted that the basic size of the foreign and colonial tiles was the same, though the colonial product was much heavier and thicker than the French one. This figure corresponds fairly well to the dimensions given hitherto.

The colonial industry cannot have been a great success as Nangle noted the following faults; the colonial tile was much heavier and showed the absence of clay weathering "as well as the full supply of impurities..." They were too thick and were not subjected to a sufficient degree of burning. (65) The tile absorbed too much water, (though the imported tile also had a fairly high porosity). This made them liable to disintegration in frosty climates. The over abundance of iron pyrites caused them to crumble. (66)

The early attempts had largely failed. The colonial tiles "did not give satisfaction due to inferior materials and/or want of knowledge in their manufacture." The want of capital retarded the development of a good colonial tile. (67)

As far as machinery was concerned the president of the Engineering Association of N.S.W. in 1895 commented that "...in the colony there were no special appliances for making tiles. Every man who had attempted to make them had done so with very primitive appliances. It was an impossibility for any of the manufacturers to make tiles with the plant that they have at the present time". (68)

Even the colonial tile of the highest quality was in danger. The Knox tile originally relied on the expensiveness of the imported article due to freight and handling for success. However the foreign tile, though at first more expensive than slate, became less expensive and waxed cheaper each year stifling colonial production. (69)

A fair amount of experimentation was going on during this time and later. The major problem was to find the right sort of machinery and to create efficient dies both of which were tasks for experts. The president of the Engineering Association of N.S.W. was able to make workable dies of the complicated Marseilles pattern, he records that he made some for a maker called Andini. (70)

Goodlet & Smith's pioneering experiments lead to the production of a very successful copy of the Marseilles tile in 1897. The description of their tile in 1904 suggests that they heeded such warnings as those of Nangle's.

"The tiles are of Marseilles pattern, and are made at our Granville Works from superior clay, free from vegetable matter, and being properly burned retain their terra cotta colour...absorbing very little moisture...Our slates have been extensively used in this state for over eight years. (71) (Their 1906 Price Book gives exactly the same information.) The 1907 Price Book states, "Our tiles have been extensively used in this state for over ten years". (72) I therefore arrived at the approximate date of 1897 as the commencement date of production. It is possible also that they exported tiles to other Australian colonies. They had contacts in

Melbourne; in 1887 it was reported that bricks burned at their Granville works were exported "all over the colonies" (73) An article published in 1915 mentioned that colonial made Marseilles pattern tiles made in Sydney had been exported to Melbourne "for the last 19 years". It was most likely Goodlet and Smith who were responsible for this.

Goodlet and Smith also manufactured roofing accessories based on Marseilles models.

"Our French pattern roofing tiles, finials, ridges, as manufactured by us at our Granville works, are well burned and do not lose their colour". (74)

It is difficult to name others producing the Marseilles pattern tiles before World War I, I suspect Maxwell Porter of Porter and Galbraith began quite early, but I can find no dates or information apart from an advertisement in 1909 mentioning their "French Pattern Tiling". (75) The report made by the Board of Trade on the roofing tiles industry in 1924 mentions that in 1915 the only locally produced roofing materials available were shingles and a small output of clay tiles manufactured by Goodlet & Smith "and one or two others". (76)

1915 was a most important turning point as far as local industries were concerned. This is especially the case in the roofing tile industry. It was that year when shipping ceased consequent on the war. Importations of both slates and tiles were halted. The building industry was forced to look for locally produced substitutes. Goodlet & Smith alone could not fulfil the demand. (77)

The Wunderlich company was foremost in making moves to meet this demand by almost immediately installing a tile making plant. Wunderlich claimed that the decision to eventually produce roofing tiles was made in 1913. (78) In their publication Forty Years of Wunderlich Industry they give a fairly crisp outline of the war time. First their steel supplies were cut off and then their tile shipments from France, (79) the two main arteries of business were severed. They claimed that "little was done in Australia in regard to the manufacture in roofing tiles prior to the war". Wunderlich like some other companies also experimented with the Marseilles tile anticipating a time when importations would become impracticable. They had, before the war, installed experimental plants at Sydney and Melbourne and purchased land suitable for the extraction of clay. "Exhaustive tests were made, and when necessity arose it was only a matter of a few months before buildings were erected and machinery installed on the sites at Rosehill and at Brunswick" (80)

Though there exist photographs of the machinery they used and processes employed (figs 7-11.) I have not yet been able to discover how they managed to obtain the appropriate machinery. Judging by war situation the machinery would had to have been locally manufactured.

George Foster & Sons seem to have taken advantage of the war situation by meeting an urgent need. George Foster started in 1898 with a Mr. Esplin to produce simple machines for the manufacture of bricks. By 1908 as a result of experiments

with new designs and the help of Foster's sons they began to concentrate on sewer pipe machines. This led them to investigate tile making machinery.

"The Fosters took the initial steps...and experimented with a tile making plant at their workshops. They got to work on the drawing of a Marseilles machine - there were no actual machines then in Australia. After some partial failures they were able to perfect a plant that met all the requirements of tile workers in this country. (81) A machine on the front cover of the Clay Products Journal of Australia illustrates a Foster Pentagon Drum machine capable of producing 5,000 tiles per day. This is the same type of machine that is mentioned as being used at Marseilles by McIntyre & Zaimani (82). The Foster machine was fitted to receive plaster of paris dies. George Foster & Sons as a company lasted until about 1969. (83)

Fosters production of the Marseilles pattern machine probably reinforced the popularity of the tile in Australia in favour of other types. Some architects were rumbling about its large size and that a smaller terra cotta tile in the shape of a shingle would be much more aesthetically appropriate to contemporary architecture. (84)

By 1916 the Wunderlich factories were in full swing, producing tiles at the rate of 3,000,000 tiles p.a. (85) One of the earliest advertisements for their own tiles appears in the S.M.H. 16 December, 1916 it revealed that they were also producing "Australian terra cotta accessories."

As a result of the demand for tiles Wunderlich was able to demand abnormally high prices. In 1907 they were charging from 7 pounds 5 shillings to 7 pounds fifteen shillings per thousand imported tiles, Goodlet and Smith were charging 7 pounds per thousand for their own tiles. (86) Wunderlich's prices for their own tiles about seven years later were from 22 pounds to 24 pounds per thousand. Attracted by the high prices other factories sprang into being, and before long the demand was exceeded. Even with fierce competition prices still ranged at 17 pounds 10 shillings to 20 pounds at first.

By 1921 there were about twenty five concerns producing the tile, the competition led to a substantial fall in prices. Some of the larger factories were able to maintain prices at 15 pounds but generally the price was more in the region of 12 pounds. (87)

Mr. A. Keegan of the Wunderlich company furnished a report stating that 18,000,000 tiles were being produced in N.S.W. p.a., that amounting to an over production of 5,000,000 tiles. (88) The Roofing Tile Company was formed in 1922 to remedy the situation. The aim of the company was not to produce tiles but to "... establish and maintain a standard price for tiles." The company actually paid small factories up to 7,500 pounds p.a. to suspend operations. This was quite a generous agreement; for example, E.L. Spear added a plant for tile-making for his brick-making plant at St.Peters. The tile presses cost him 800 pounds and the drying sheds 4,000 pounds. The drying sheds and kilns could be used for other purposes. Spear received 3,000 pounds p.a., and 500 pounds p.a. from a local competitor whose works benefited by closing the

The cost of installing a plant in works already producing bricks or pottery was quite small. (90) The larger firms such as Wunderlich or Galbraith & Porter intending to set up major businesses in tile making spent considerably more. Galbraith & Porter started producing in a large way in 1920. They spent 21,665 pounds on land, plant and machinery. That year they produced 1,858,197 tiles, the manufacturing cost per thousand was 9 pounds one shilling and 10 pence. (91)

COLONIAL AND FOREIGN MADE MARSEILLES PATTERN TILES.

The tile exported from Marseilles differed from the tile intended for home markets. Grey tiles, resulting from the use of the lower level clays, were the type most favoured around the Mediterranean. Red tiles resulting from the surface clays were more popular in tropical countries, especially in Australasia. (92)

There is, of course, one simple way of discerning the difference between the tiles made at Marseilles and those colonial produced, and that is by reading the inscription on the reverse of the tile. Once having done this one may check with the records to see when the manufacturers began production and when they ceased production. It should then be ascertained to what stage the tile belongs in the history of the firm, for this a strict typological chart must be formed within each makers production life span.

There are a number of basic differences between the locally produced tile and the imported one. The foreign tile is generally yellow or reddish in colour, the locally produced having a redder tinge (93) At closer range the makers trade mark may be seen on the triangular section on the surface of the imported tile a feature local productions lack. Some of the foreign tiles have fewer diagonal grooves running along the side of the tile.

In 1895 the foreign made tile had the following dimensions 9-3/4" x 1'4-3/4" x 7/16" and weighed about 4-lb.10-ozs. The colonial measured about 9-3/4" x 1'4 1/2" x 11/16" and weighed about 7-lb. 12 1/2-oz. and bore a full red colour. (94) Obviously the colonial tile should be noted for its extra weight due to the thickness of the tile which compensated for the lack of burning and the abundant impurities. The colonial tile was probably moulded by a hand press rather than by more sophisticated machinery. The poor burning often resulted in a lack of uniformity of colour, the Marseilles workers were most likely using Hoffman kilns at that time.

Dr. Errey (of Melbourne) reports that just before WWI the makers at Marseilles simplified the design, the diagonal grooves and delicate shape being omitted and the whole flattened. She claims it was this form that was used by Australian manufacturers resulting in a tile 9-7/8" x 1'4 1/2" x 1" to 1 1/4" weighing 5-lb.6-ozs. (95) I don't know much about the situation at Melbourne apart from what the Wunderlich company was doing, but I have not found any simplification in the design of the Marseilles tile during that time nor have I found that locally produced tiles (in the case of the major manufacturers) assumed a more simplified shape, they were however still thicker and the colour a deeper red.

Locally produced tiles produced between the years 1916 and 1922 should be fairly easy to tell from tiles produced later. The majority of tile makers during these years represented family concerns. (96) The fall in prices during that time forced the tile makers to spend less time on preparing the clay properly, forming the tile and burning, - which was expensive. There was much ignorance in drying and burning and the blending of clays resulting in a most inferior product. Cracked defective tiles were placed on the market as "second grades" Competitors to the already established companies had to work under primitive conditions. (97)

Tiles after 1922 improved immensely. After the formation of the Roofing Tiles Limited the Board of Trade was compelled to report that the higher prices established by the company resulted in the manufacturers being able to spend more money on the burning of the tiles properly, improvements in machinery were made, and sorting at the kiln became more critical. This resulted in a harder and more durable product and a better uniformity of colour was arrived at. (98)

Apart from the tiles produced by Wunderlich (they secured Government contracts to roof War Veteran's Homes) (99) Galbraith and Porter (considered one of the best in the opinion of the Board) (100) and some others, the tile produced during 1916-1922 was a very poor specimen indeed with the above listed defects as their trade mark.

A number of companies agreed to temporarily suspend production of roofing tiles under agreements made in the formation of the Roofing Tiles Company in 1922. The following is a list of all the companies producing roofing tiles in 1921 and the amount of tiles they produced in that year. Those companies marked with an asterisk ceased production in 1922. Some did not resume after a few years.

Wunderlich Ltd.	4,500,000
Goodlet & Smith Ltd.	1,500,000
Central Brick Co.Ltd.	1,500,000
Porter & Galbraith	1,500,000
W.Wilson, Ltd.	1,250,000
H.W. Benson	750,000
Ferguson Bros. *	750,000
E.L. Speare *	750,000
R.Shannon Brick, Tile & Pottery Co.Ltd.	750,000
Ryde Brick & Tile Company Ltd.	750,000
Newman & Underwood Tile Co.Ltd.	500,000
Strathfield & Enfield Brick & Tile Co. *	500,000
The Lion Tile Company Ltd.	500,000
F.A. Mashman & Co.Ltd. *	500,000
I. Lazer & Sons	500,000
Argyle Tile Co.	500,000
Liverpool Tile & Terracotta Co. * ,	250,000
Bankstown Brick & Tile Co. *	250,000
Butcher Bros. & Co.Ltd. *	250,000
Kingswood Brick & Tile Co.Ltd.	250,000
The Marsfield Brick, Tile & Pottery Works Ltd.*	250,000
E.J. Simms	250,000
Mashman Bros.	125,000
J.H. Leitch *	125,000

THE WUNDERLICH ROOFING TILE

The information gathered for this section was compiled largely from Wunderlich catalogues, booklets and sundry advertisements. The disadvantage is that most of these publications deal primarily with their other products. I have only been able to find two booklets, published in the late 'twenties and early 'thirties, which deal solely with terra cotta roofing.

By 1916 the Wunderlich factory at Rosehill was fully set up and produced 1,660,342 tiles in that year (101) at the rate of 3,000,000 p.a. (102) For daily output 80 tons of clay was needed, 100 acres provided the clay necessary for production. (103) The Brunswick tileries were producing about half the amount p.a. (104)

During the period of importations only red tiles were available (105) The earliest tiles made by Wunderlich were also red and unglazed.

Booklet M68 informs us that the development of colour in the Wunderlich tile had been gradual up to 1929.

"The show boards are of particular interest, as illustrating the progress made in the development of an enlarged range of standard colours, during the fifteen years of the Wunderlich Tile Works" (106)

Taste gradually began to change, and the demand was created for a variety of colours, this process was slow the Technical Guide of 1932 states;

"The uniform red, however, that the public formerly insisted upon, is gradually giving place to a great variety of other colours."

Quite a bit of experimentation was in progress during the early years in the attempt to introduce new effects.

"As an outcome of prolonged experimenting at the Wunderlich tileries, there is now available a range of colours that was undreamt of before local manufacture commenced in earnest." (107)

The first coloured tiles appeared about mid 1924. Wunderlich established a works for architectural terra cotta at Rosehill in 1923. A "leading" American ceramic engineer and an expert works superintendent was engaged to start off the new industry. In 1924 the architectural terra cotta works began operation (108) and extensions were made to it in 1925 and in 1926. (109) It was with the impetus of the ceramic section of the terra cotta works that inspired Wunderlich to apply the new knowledge to their roofing tiles. Improved methods of burning were introduced to ensure control over the colour of the tiles and terra cotta goods.

There was no attempt to especially promote any other but the dull-red tile even in 1924. Advertisements previous to June 1924 do not mention the availability of colour in their roofing tiles. An advertisement in Building of 12 June, 1924 (110) offers "several shades of red and chocolate." In the issue of the 12th of December that year, brindle is added. From that time on until 1930 the advertisement remains unchanged.

In 1925 Wunderlich offered the public their full range; -

"We can offer a wonderful variety of red, buff, brindle, and chocolate coloured tiles, and will carry out the fixing anywhere." (111)

In the same booklet, quoted above, there are three illustrations of houses with dull red roofs. The one illustration of a roofing tile is also represented as a full red one.

About that time architectural terra cotta blocks were offered with a dull mat or a lustrous glazed surface, this is an indication of their next step, and that was to offer roofing tiles semi or fully glazed. This was achieved by 1927 when they offered tiles in the "...well known shades of red, there are now available brindle, buff, chocolate shades, blended colours and full & semi glazed effects." (112) A "glowing purple" may also be added to the 1927 list. (113)

The way in which the tiles were used may also help in dating. The Australia Beautiful ran several advertisements for Wunderlich in 1927 emphasising the new trend of blending colours on roofs. The newness of this fashion is emphasised by statements such as ; "...rich, blending of many tints is the latest note in home building" and "Blended colour in roof tiles is warmly welcomed by leading architects."

The blending of colour in roofing tiles becomes a more marked trend toward the close of the 1920's and strongly promoted in the early 1930's

By 1933 they were also producing a green tile and other novelties.

"Varying tastes are catered for in a wide range of colours from shades of red and chocolate, buff, green, golden brown and clinker, to fine flashed effects and full glazes." (114)

The introduction of the green tile was a revolutionary addition to their colour range. It belongs to the early part of the 1930's (115)

1927 is also significant for terra cotta roofing. Wunderlich introduced a few different types of tiles to meet with current styles of architecture, these being Mission, Spanish and shingle tiles. (116) Mission & shingle tiles last into the 1950s though there is no further mention of the Spanish tiles after the 1920's. The sizes of the new tiles were radically different but were anticipated by E. Jaeferson Jackson. 131 Wunderlich

Marseilles tiles fitted to a square of roofing, 288 Mission (smalls) and 560 shingle tiles were required for the same area. (117)

By the mid 1930's other companies had caught up with Wunderlich and were offering the same ranges of tiles. The Newman-Underwood Co. offered roofing tiles in "All colours and all combinations", an illustration of a house in their advertisement indicates a flatter and simplified tile (118) Goodlet and Smith offered "Marseilles Pattern roofing tiles - in varied shades & colours, glazed, mottled, and semi glazed." (119)

The following list is a summary of the preceding pages concerning the colonially made tile from the 1890's to the 1930's.

Knox's improved French ball-bearing tile-Enfield Brick Co: 1894....Goodlet & Smith 1897 to 1930's.

See previous list for factories beginning during W.W.I; those marked with asterisk suspended operation in 1922. For the approximate dates of resumption of operations consult the Aust. Manufacturers Directory.

Wunderlich	Red unglazed roofing tiles	1916 -
	Shades or red	mid 1924
	Chocolate	ditto
	Brindle	Dec. 1924
	Buff	Apr. 1925
	Semi glazed & glazed tiles	by 1927
	Purple	1927
	Mission, Spanish & shingle tiles	1927
	Green tiles	by 1933
	Golden Brown	ditto
	Clinker	ditto
	'Fire Flashed'	ditto

The above list is a provisional one. Eventually minor differences within, for example, the new unglazed tile will be chartered in a chronological sequence. The Red unglazed Wunderlich Tiles vary. Some that I have examined bear a waratah trade mark others omit this. Some carry inscriptions omitting the word "Rosehill" etc.

Robert V.J. Varman.

FOOTNOTES

ABBREVIATIONS USED IN FOOTNOTES

ABCN	Australasian Builders' & Contractors' News
BEJANZ	Building & Engineering Journal of Australia & New Zealand.
CPJA	Clay Products Journal of Australia.
Forty Years	Forty Years of Wunderlich Industry 1887-1927.
Legl.Ass.	Legislative Assembly of N.S.W. Report: Roofing Tiles Industrt. 1924.
RVIAJ	Royal Victorian Institute of Architects Journal & Proceedings.
S.D.	Sands' Directory.

1. Lefèvre, L., Architectural Pottery, (Lon.1900) pp. 287,321.
2. *ibid.*, p.286.
3. McIntyre, W.A. and Zaiman, A. The Manufacture of Roofing Tiles in France, etc. Building Resources Bulletin No.4, 1928. p.10.
4. Bourry, E. A Treatise on Ceramic Industries. etc. (Lon.1911) p.508.
5. Lefèvre, *op.cit.*, p.323.
6. *ibid.*, p.324.
7. McIntyre and Zaiman, *op.cit.* p.18.
8. *ibid.*, p.6.
9. *ibid.*, p.8.
10. Lefèvre, *op.cit.*, p.339.
11. Boyd, R. Australia's Home. (Penguin ed., 1968.) p.152 and Freeland, J.M. Architecture in Australia. (Pelican ed., 1972) p.193.
12. Errey, E.L. Victorian Architectural Ornament 1880-1920 (PhD Thesis. Melbourne University, 1973) p.23.
13. McLean, J. Roofing Materials in Australia 1850-1940. (History 4 Thesis, Architecture Dept. Melbourne University 1956) and Errey, *op.cit.*, p.23.
14. Boyd, *op.cit.*, p.152.
15. Boyd, R. The Walls Around Us. (Melb.1962) p.48.
16. Bourry, *op.cit.*, p.507.
17. The Building Times, Melb. 15.10.1869. p.5.
18. McCawley, J. Roofing, Estimating, Applying and Repairing. (N.Y. 1938) p.9.
19. ABCN 14.5.1887. p.3.
20. ABCN 18.6.1887. p.9.
21. Freeland, *op.cit.*, p.193.
22. Boyd, *op.cit.* (1968) p.152.
23. SD 1886. p.609.
24. ABCN 20.4.1889 p.372.
25. ABCN 15.4.1890 p.849.
26. Building 18.2.1908 p.40.
27. Forty Years p.5.
28. *ibid.*, p.9.
29. *ibid.*, p.10.
30. *ibid.*, p.13.
31. BEJANZ 7.1.1893 p.10.
32. *ibid.*
33. BEJANZ 17.2.1894 p.52.
34. BEJANZ 26.4.1894 p.164.
35. *ibid.*
36. SD 1894 p.939.
37. SD 1896 p.828.

39. BEJANZ 11.3.1893 p.93.
40. BEJANZ 7.1.1893 p.10.
41. BEJANZ 26.5.1894 p.113.
42. SD 1903 p.1201.
43. Forty Years p.15.
44. *ibid.*
45. BEJANZ 24.5.1894 p.164.
46. BEJANZ 8.8.1895 p.4.
47. Building 18.2.1908 p.40.
48. Building Australia Exhibition Oct.-Nov., 1909 p.116.
49. SD 1918 p.2062.
50. Boyd, *op.cit.* (1968) p.152 and Freeland, *op.cit.*, p.193.
51. McLean *op.cit.*, (unpaginated).
52. Maye's Australian Builders' Price Book 1862 p.35.
53. Building Times 15.10.1869 p.5.
54. Goodlet and Smith Ltd. Syd. Prices Current 1904 p.4.
55. Building 12.4.1916 p.161.
56. Official Record of the Sydney International Exhibition 1879 (Syd.1881) p.209.
57. ABCN 10.12.1887 p.494.
58. *ibid.*
59. Art and Architecture, N.S.W., 1905 p.106.
60. ABCN 15.4.1890 p.849.
61. BEJANZ 8.4.1893 p.291.
62. RVIAJ Jan.1915 p.277.
63. BEJANZ 21.4.1894. p.113.
64. Engineering Association of N.S.W. Proceedings. Vol.10, 1894, 1895 p.90.
65. *ibid.*, p.91.
66. *ibid.*, p.89.
67. *ibid.*, pp.95, 96.
68. Engineering Association of N.S.W. Article on Roofing by J.Nangle 8.8.1895 pp.4, 5.
69. *ibid.*
70. *ibid.*, p.4.
71. Goodlet and Smith Ltd. Std., Prices Current 1904. p.34.
72. Goodlet and Smith Ltd. Std., Prices Current 1907 p.35.
73. ABCN 28.5.1887 p.341.
74. Goodlet and Smith, *op.cit.* (1904) p.5.
75. The Building Australia Exhibition Oct.-Nov. 1909 p.116.
76. Leg.Ass. p.838.
77. *ibid.*
78. Forty Years p.167.
79. *ibid.*, p.18.
80. *ibid.*, p.109.
81. CPJA Oct.1934 p.11.
82. McIntyre and Zaiman *op.cit.*, p.11.
83. See the Australian Manufacturers Directory to 1937 and the Directory of Manufacturers from thence on.
84. Building 18.2.1908 p.40.
85. Forty Years p.18.
86. Australian Building Estimator 1907. p.200.
87. Leg.Ass. p.838.
88. *ibid.*, p.839.
89. *ibid.*, p.842.
90. *ibid.*, p.853.
91. *ibid.*, p.854.
92. RVIAJ Jan.1915 pp.277, 278.
93. Errey *op.cit.*, p.22.

94. Engineering Association of N.S.W. Proceedings vol.10, 1894, 1895 p.94.
95. Errey op.cit., p.22.
96. Leg.Ass. p.852.
97. *ibid.*, p.851.
98. *ibid.*
99. Forty Years p.118
100. Leg.Ass., op.cit., p.852.
101. Wunderlich Ltd., Roofs of Tile (1929). p.47.
102. Forty Years p.18.
103. *ibid.*, p.110.
104. *ibid.*, p.167.
105. Wunderlich Ltd; Boodlet MGB 18.12.1929 p.9.
106. *ibid.*
107. Forty Years p.20.
108. *ibid.*
109. *ibid.*, p.21.
110. Building 12.6.1924 p.95.
111. Wunderlich Ltd; Booklet M10 1.4.1925 p.11.
112. Forty Years p.110.
113. Advertisements in Australia Beautiful 1927.
114. Wunderlich Ltd; Booklet M80 1.1.1933.
115. Proof copy of a booklet by Wunderlich Ltd. promoting the Green Tile, held at the C.S.R. Offices, Sydney.
116. Forty Years p.110.
117. Wunderlich Ltd; Booklet M85 July 1954 p.36.
118. CPJA Jan.1934 p.4.
119. CPJA Feb.1934 p.8.

BIBLIOGRAPHY

BOOKS, ARTICLES & MANUSCRIPTS.

- Bourry, E. A Treatise on Ceramic Industries.etc. (Lon.1911).
- Boyd, R. Australia's Home. (Penguin ed.1968).
- The Walls Around Us. (Melb.1962).
- Errey, E.L. Victorian Architectural Ornament 1880-1920. (PhD Thesis, Melbourne University, 1937).
- Freeland, J.M. Architecture in Australia (Pelican ed. 1972).
- Lefèvre, L. Architectural Pottery (Lon.1900).
- McCawley, J. Roofing, Estimating, Applying and Repairing (N.Y.1938).
- McIntyre, W.A. and Zaiman, A. The Manufacture of Roofing Tiles in France etc. Building Resources Bulletin No.4 1928 (Lon.)
- McLean, J. Roofing Materials in Australia 1850-1940 (History 4 Thesis, Dept. of Architecture, Melbourne University, 1956).

JOURNALS AND SPECIAL PUBLICATIONS

Art and Architecture

Australia Beautiful

The Australasian Builders' and Contractors' News

The Australasian Building Estimator

The Australian Manufacturers Directory

Building

Building Australia

The Building Australia Exhibition Oct.-Nov. 1909.

The Building and Engineering Journal of Australia and New Zealand

The Building Times

The Clay Products Journal of Australia

The Directory of Manufacturers

The Engineering Association of N.S.W. Proceedings

Goodlet and Smith Ltd. Syd., Prices Current 1904, 1906 and 1907.

The Legislative Assembly of N.S.W.' Report, Roofing Tiles Industry 1924.

Maye's Australian Builders' Price Book 1862

The Official Record of the Sydney International Exhibition 1879 (Syd. 1881).

The Royal Victorian Institute of Architects Journal and Proceedings

Sands' Directory

Wunderlich Ltd.; Forty Years of Wunderlich Industry 1887-1927

- Roofs of Tile (1929)

- Booklet; M10 1.4.1925

- " MG8 18.12.1929

- " M80 1.1.1933

- " M85 July 1954

ILLUSTRATIONS

Illustrations are taken from Wunderlich's Forty Years of Wunderlich Industry (frontispiece and figs. 7-11), Bourry's Treatise (figs. 1 and 2), Lefevre's Architectural Pottery (figs. 3 and 4), McIntyre and Zaiman's Manufacture of Roofing Tiles (fig. 5) and The Australasian Builders' and Contractors' News (4.10.1890), bibliographical details as above. Fig. 6 is from A.T. Ackworth, The Manufacture of Roofing Tiles, London (no date).

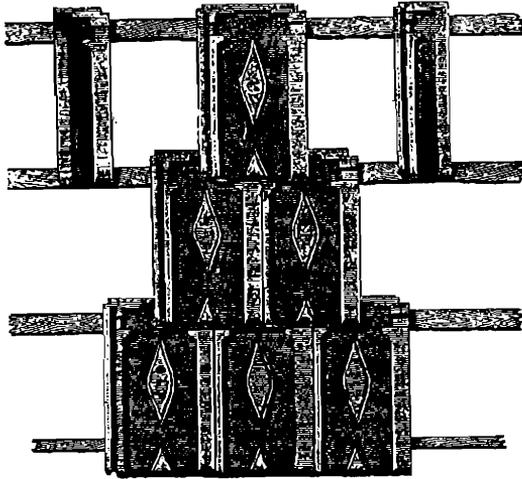


Fig. 1 Gilardoni or Lozenge Tile

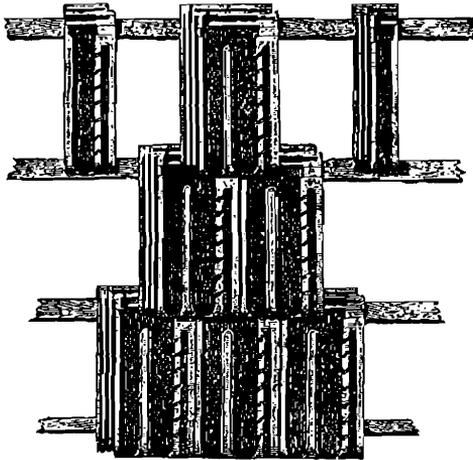


Fig. 2 Marseilles Tile

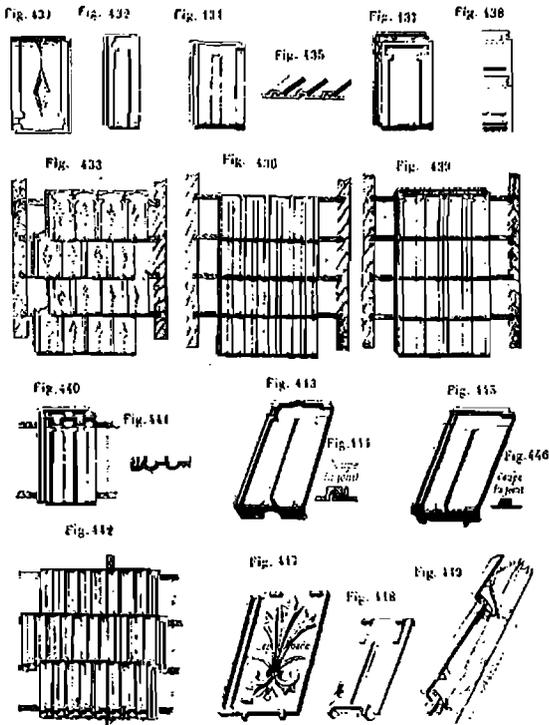


Fig. 3 Vertical interrupted join (433)
Vertical continuous join (436, 437)

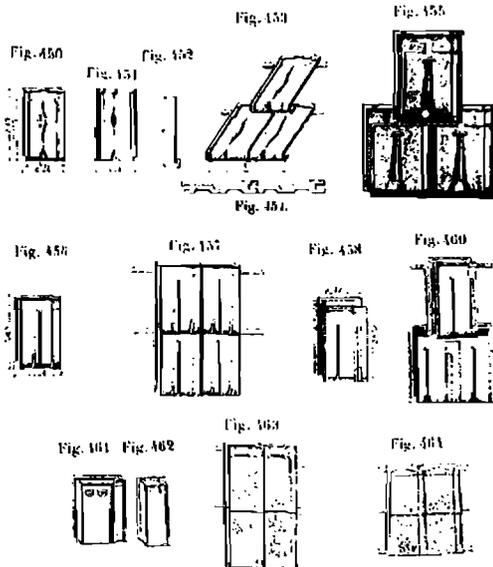
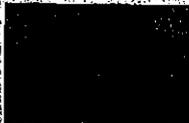


Fig. 4 Tiles 1900

			
PLAIN TILE	DOUBLE ROMAN	BEAUVAIS	COURTRAI DU NORD
			
MARS ELLES	10TH NATURAL SIZE (LINEAR)	GIAR DÒNE	MOULES

SOME PATTERNS OF ROOFING TILES



1. Plain tile
2. Fish tail tile
3. Round end tile
4. Club end tile
5. Gothic club end tile
6. Flat end tile
7. Pointed tile
8. Gothic point tile
9. Tile and half or gable tile
10. Eave tile
11. Ornament for grooved ridge tile
12. Octagon hip tile
13. Finial
14. Pan tile
15. Madeira or Spanish tile
16. Diamond tile
17. Hip tile
18. Valley tile
19. Roman tile
20. Plain tile with continuous nib
21. Corrugated or wave tile
22. Watson's fluted tile
23. Angle tile
24. Rolled ridge tile
25. Plain ridge tile
26. Saddle back tile
27. Capped ridge tile
28. Expanding ridge tile
29. Crested ridge tile

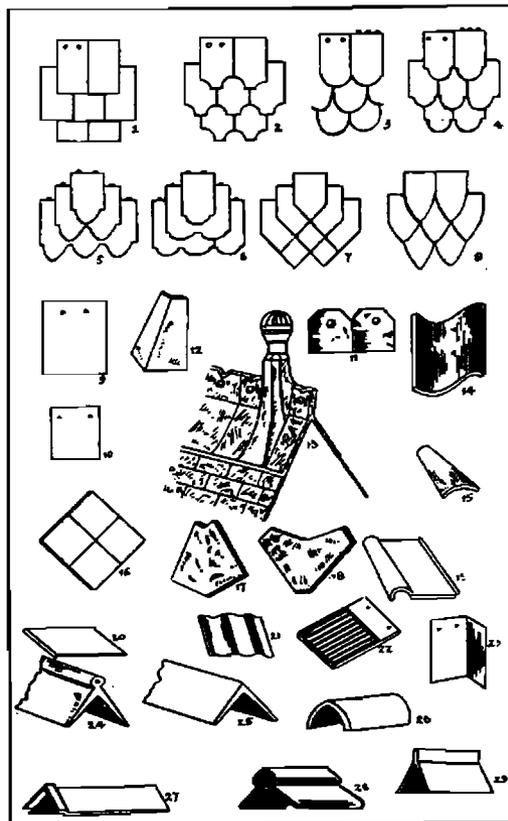
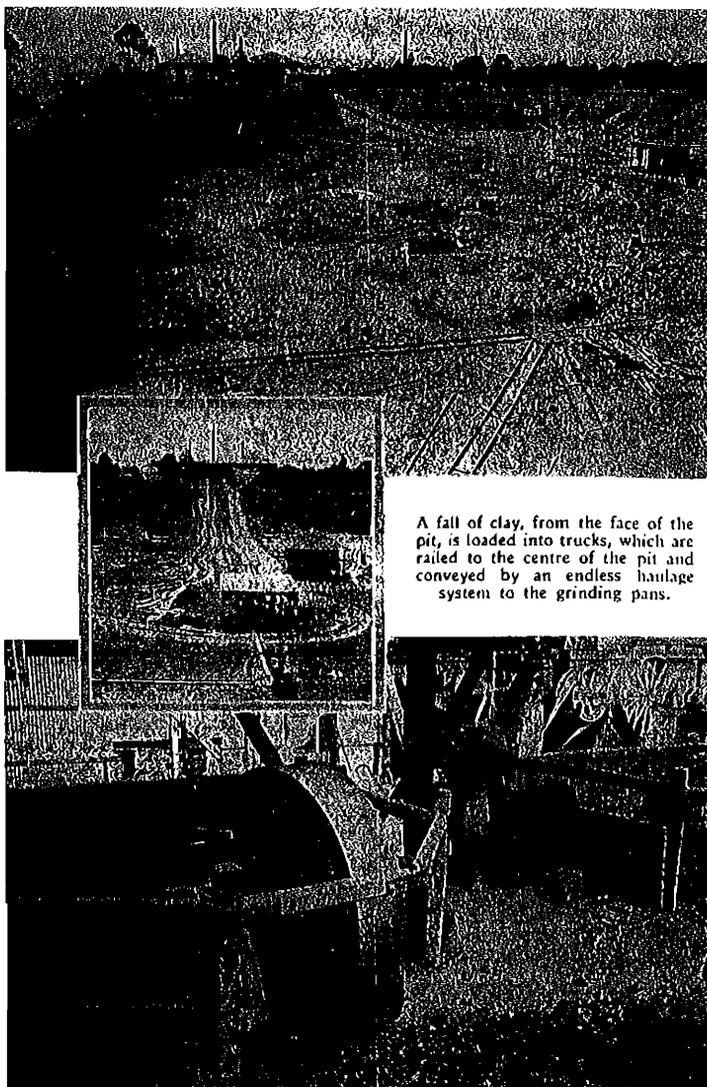


Fig. 6 English tiles of the late nineteenth century



A fall of clay, from the face of the pit, is loaded into trucks, which are railed to the centre of the pit and conveyed by an endless haulage system to the grinding pans.

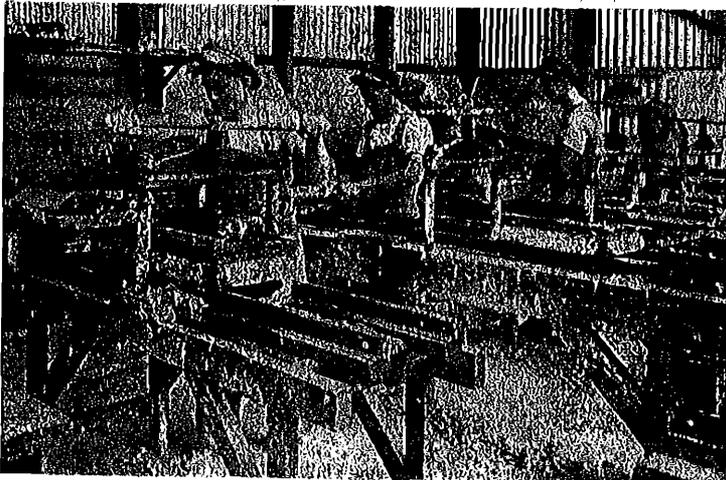
Clay from the pit is ground while in a moist condition.

Fig. 7

Figs. 7 - 11 The tile making process at Wunderlich's
Rose Hill Plant, 1927

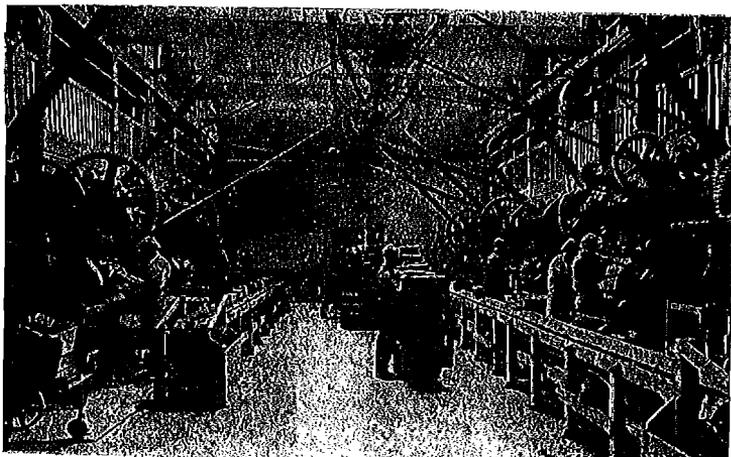


The ground clay is fed automatically into the mixing machines, through which it passes into pugging machines.

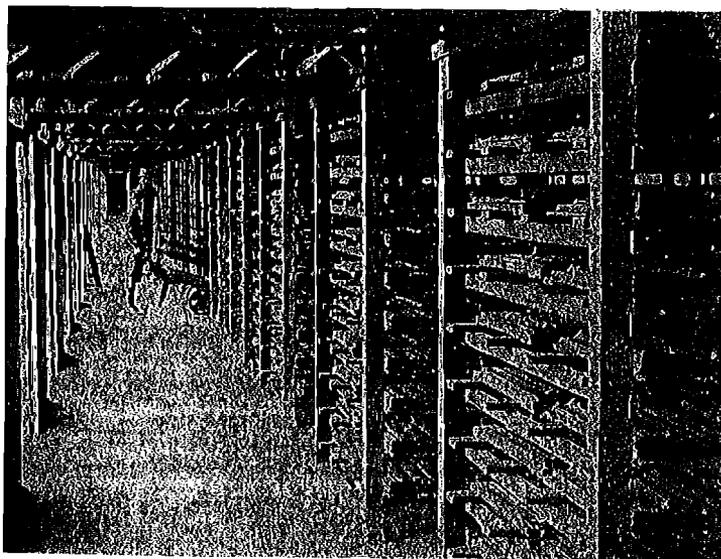


Dies for the Tile Presses are made here, in plaster.

Fig. 8



Travelling along belt conveyors, from the pugging machines, the wet clay bats are formed into tiles on these presses.

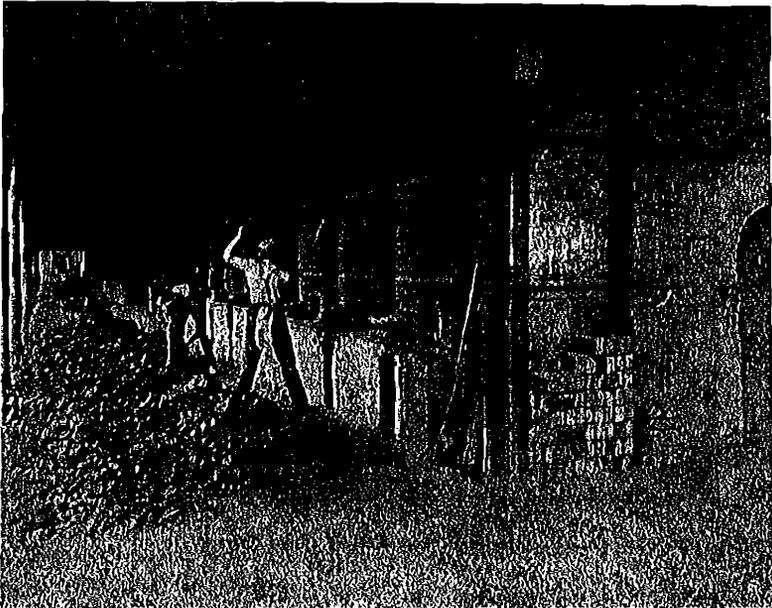


The clay tiles from the presses are stored on racks, to dry.

Fig. 9

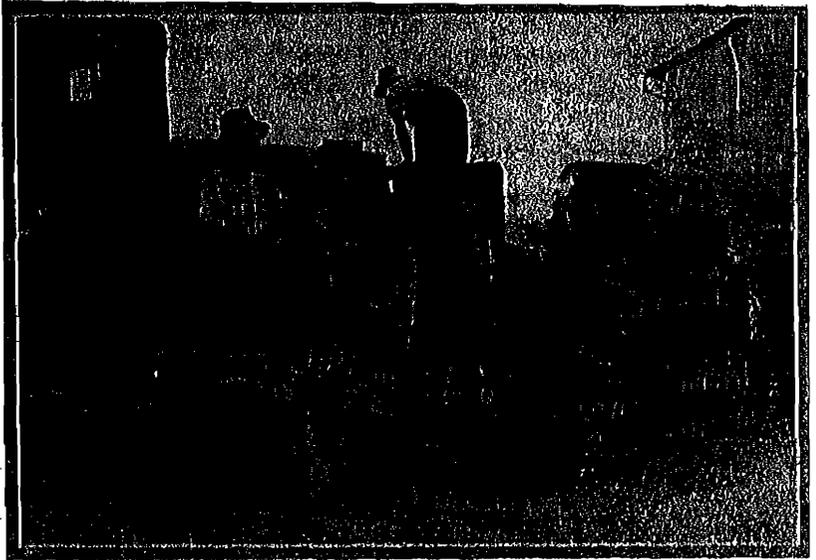


When dry, the Tiles are "set" in a kiln; the entrance is sealed, and "burning" commences under "pyrometer" control.

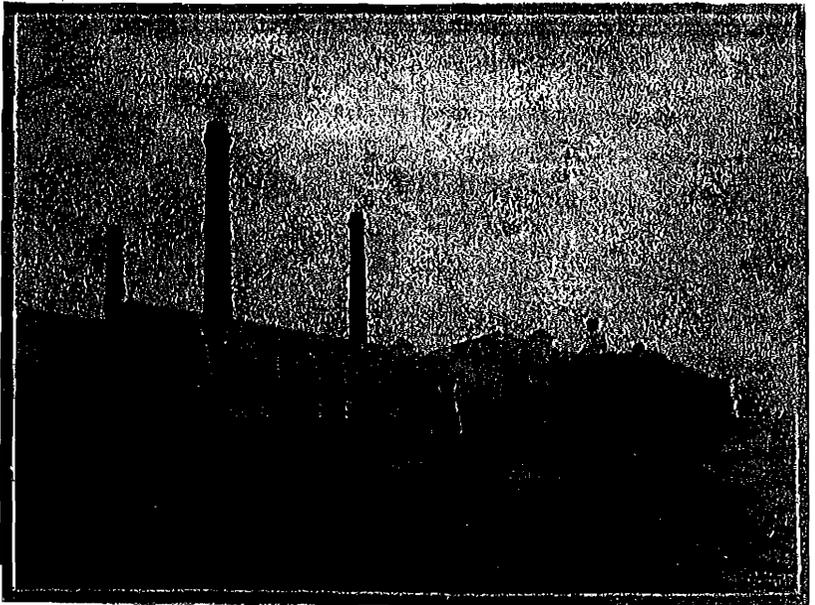


Day and night the kiln fires are kept going, until "burning" is complete.

Fig. 10



When taken from the kilns, the tiles are sorted and tested.



The Rosehill Works are handy to rail, road and steamer.

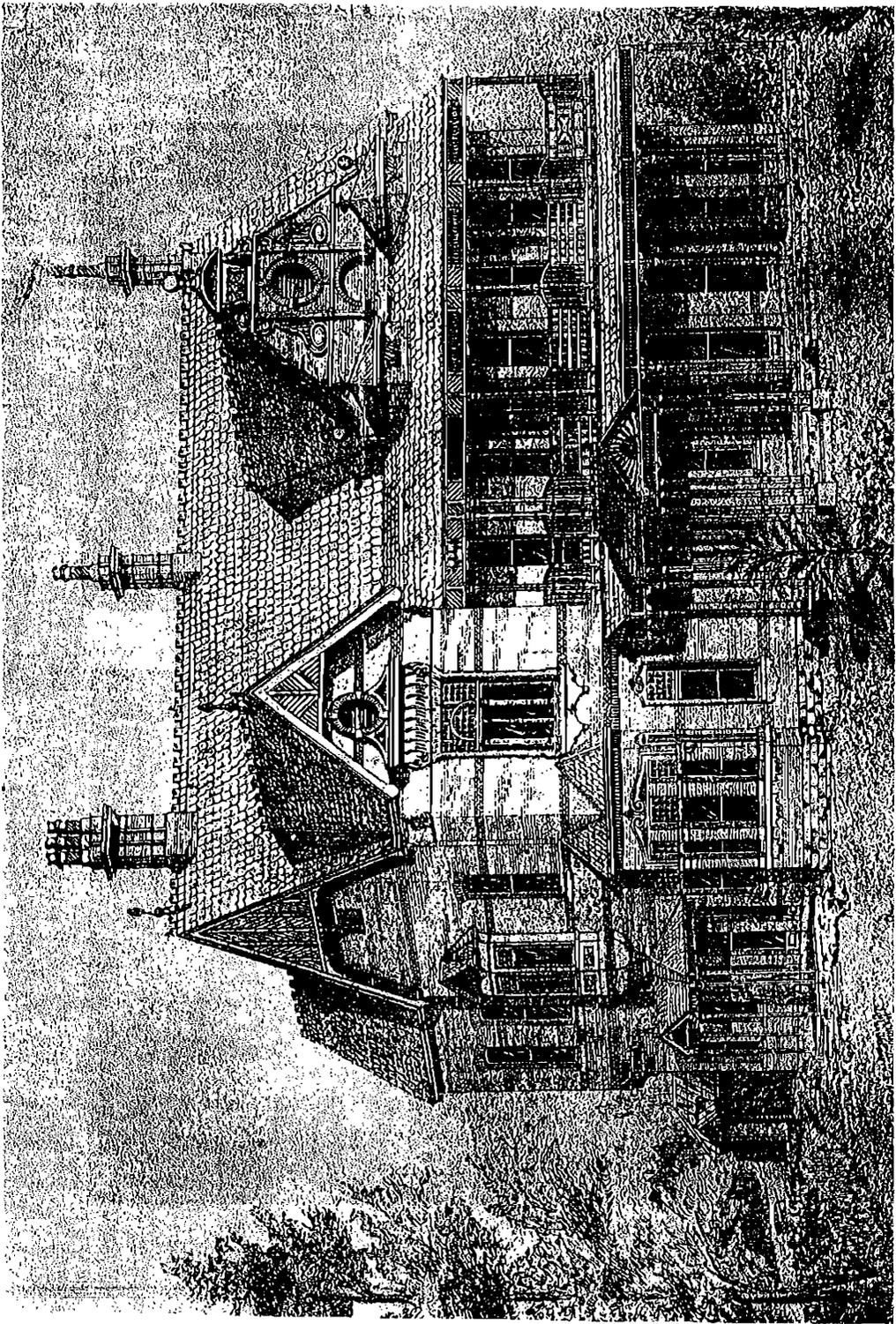


Fig. 12 Hotel Medlow, Medlow Bath 1890 with "French Tiles"