SUSSEX INDUSTRIAL HISTORY

SWISS GARDENS SHOREHAM 1902

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Edited by Dr. Brian Austen, 1 Mercedes Cottages, St. John's Road, Haywards Heath, West Sussex RH16 4EH (Tel 413845). The Editor would be interested to hear from prospective contributors of articles of any length. Shorter notices can be included in the Society's *Newsletter* which is issued four times a year.

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Membership enquiries to the Hon. Secretary, R.G. Martin, 42 Falmer Avenue, Saltdean, Brighton BN2 8FG (Tel. 303805).

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Cover illustration of the entrance to the Swiss Gardens based on a photograph in the Marlipins Museum, Shoreham (Sussex Archaeological Society).

ROY SHARP

The Swiss Gardens, Shoreham by Sea

Throughout the second half of the last century Shoreham-by-Sea in West Sussex was a mecca for many thousands of people. They came from all age groups, from all walks of life, from near and from far; and all intent upon one thing – pleasure! Daily, visitors would arrive by train and tram, by boat and bus, aboard coach or carriage, on bicycles and on foot. It has been said that on occasions as many as five thousand "pleasure seekers" spent the day in Shoreham. At the time this was equivalent to twice the residential population of the town.

How was is that this modest harbour township was chosen as a destination by such large numbers? Why did people from as far away as Portsmouth and London descend on Shoreham rather than, say, Brighton or Worthing? What was the attraction that caused these Victorians to come in droves on their "cheap day" excursions, their Sunday School treats, their family picnics, their firm's outings, or even their clandestine appointments? For over half a century the vast army of "day trippers" which flocked to Shoreham came eager to sample the delights of a single emporium renowned throughout the South of England for its entertainment – namely the "Swiss Gardens".

The Swiss Gardens were opened in 1838, the year of Queen Victoria's coronation, by a local ship-builder and dignitary by the name of James Britton Balley (who, incidentally, is occasionally incorrectly referred to as "J.B. Bailey" in some works of reference). The Gardens and the new and elegant Swiss Cottage Assembly Room quickly became popular with local people who would frequently gather there for a dinner or luncheon to mark or celebrate some important event, such as the ceremonial launching, earlier in the day, of a new ship from one of the builders' yards – perhaps even from one of Balley's own. On such occasions it became usual to round off a day of festivities with a gala-ball in the magnificent ballroom which the Gardens boasted. Henry Cheal, the Shoreham historian, considered that the ballroom, which had a floor of over eight thousand square feet, was probably the finest on the South Coast.

Some years before his death in 1863, J.B. Balley sold the Gardens to a Mr. Edward Goodchild, for what at the time was reported to be "a very large sum". Under the new management of Mr. Goodchild, aided by his wife, the Gardens went from strength to strength. The Goodchilds greatly improved the facilities and ran the gardens very successfully as a family concern until the mid 1870s. By 1878 however the Gardens had new proprietors – J.B. & G. Mallison.

The Swiss Gardens Lake, of which only a small section remains to give pleasure to the residential and visiting water birds and humans alike (fig 2), boasted a little steamboat called the "Basilisk" of about half a horse-power which was capable of carrying up to ten "Trippers" at a time. In addition, at various times, there have been several other forms of floating craft, albeit mostly manpowered, such as punts, rowing boats, Indian canoes and modern kayaks (fig 4). Naturally a hire charge was usually made for some of these boating pleasures, but a railway poster dated 1856 clearly shows that patrons of the day could obtain really good value for their money at the Gardens. Similarly, an old photograph shows a plaque on the outside of the Swiss Gardens advertising that: "No charge is made for any of the amusements in the Gardens except a small one for: Billiards, Rifle shooting and American Bowls", and "Admission One Shilling, Children under ten years 6d".

Included in the price of admission, in addition to the lovely ornamental lake and tastefully laid out and well kept gardens themselves, were the facilities for such diverse pastimes as fishing in the lake and dancing the gavotte to a Prussian Band. Around the ornamental trees and shrubs of the Gardens freely strutted the equally ornamental peacocks. An aviary containing many exotic and colourful birds from all over the world was well placed among the flowerbeds and trees. There were many paths for both young and old to follow between the boughs and the blooms, with delightful arbours and little summer-houses to offer rest to the elderly, privacy to the young at heart, and playgrounds for the juvenile. There were well kept mazes to provide additional interest for all age groups, together with the furniture and fittings without which any self-respecting recreation ground would be incomplete, namely: swings, roundabouts, see-saws, slides and countless other sickness and shriek-provoking apparatus. Not only were these provided in the "Children's Corner", but being the Victorian era, they were also available to the "grown-ups"; separate Ladies' and Gentleman's swings were available for those who desired them, naturally!

The catalogue of free amusements available in the Gardens at one time or another is almost unbelievable by the financially orientated standards of the British Amusement Park Industry of recent decades. However, the large Ferris wheel seems to have turned its full circle at last, with the welcome return of a single admission charge again becoming a common practice.

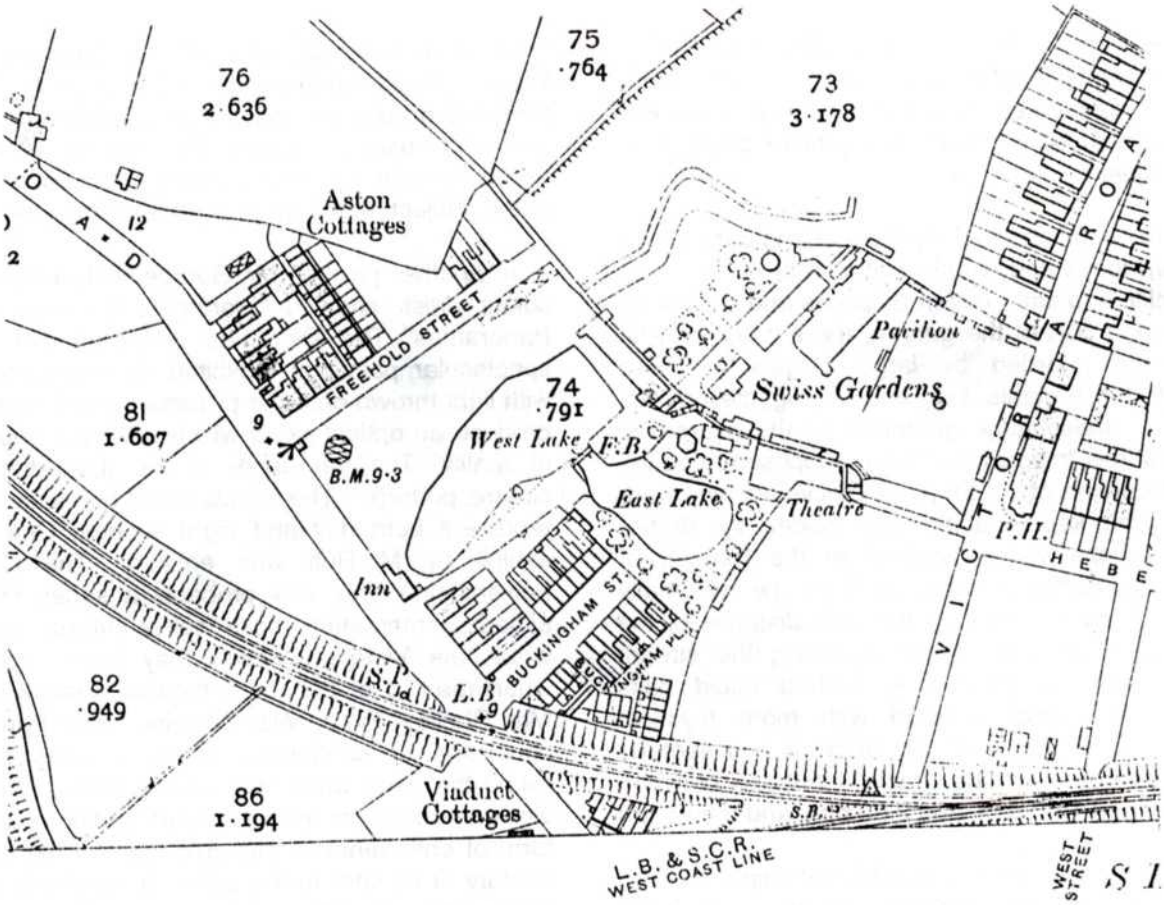


Fig 1. Extract from the third edition (1912) 25" (1:2500) Ordnance Survey Map.

Fig 2. Gardens at the rear of the Swiss Cottage public house showing part of the West Lake of the Swiss Gardens (1991). Ron Martin

In his *History of Brighton and Environs* (1871), Alderman Henry Martin said that: " ... the Swiss Gardens ... presented as great a variety of amusements as could be met with in any other place of its kind in England".

A grotto containing a chalybeate spring surrounded by fragrant roses and overflowing with sweet smelling honeysuckle and other odiferous plants and shrubs lay in a secluded part of the garden, the entrance to the grotto being guarded by large effigies of those legendary British giants, Gog and Magog; cleverly apt perhaps, as these huge guardians of the overgrown entrance of this "magic cave" were supposed to be the wicked daughters of the Emperor Diocletian, who were captured and kept chained and hidden by Brutte. However, if the visitor baulked at the thought of entering the grotto it could at least be externally viewed to some extent from the safe distance of the picturesque "Bridge of Steps" spanning the stream (Fig 4). Close by, those who wished could pass through a low door covered with more mystical characters to consult with the discreet and esoteric "Lady of the Temple of the Oracle" – but only between 11.00 a.m. and 1.00 p.m. and 2.00 p.m. and 6.00 p.m.!

A battery of six carronades, a kind of ship's cannon, would occasionally sound off to start an event on the sports field such as a balloon ascent (Fig 6) or the beginning of a firework display; or simply as an additional entertainment for the crowds. To cater for the sporting types there was a bowling green, an archery field and a cricket pitch on which matches were played. The whole Gardens and surrounding area could be viewed from the top of an observatory which took the form of a high observation tower shaped rather like a lighthouse and with just as many steps to climb to the top (Figs 3,5).

We are told that even during the winter months the Gardens were well attended. At weekends, large numbers of both sexes would gather at the lakeside, in order to partake of the "healthful and agreeable exercise" of skating on the frozen lakes. However, whatever the season, if the weather was unkind or the patrons were disposed to occupying their time more sedately, the many indoor facilities provided may have been more to their taste. Dotted around the grounds there were various small pavilions in which young and old could sit sheltered from the elements. Then there was the famous "Main Pavilion", in which a visitor might choose to "take tea" or simply "be seen" with his many like-minded companions. This Pavilion is reported to have been able to seat a thousand people.

Two museums were advertised. One contained a gallery exhibiting photographs taken by Mr. W. Lane (who, it is believed, was also in business at 213 Western Road, Brighton, during this period). Copies of the photographs on show were available for sale; or should a customer prefer, Mr. Lane or his assistant would execute a postcard sized photographic portrait of the subject, at the modest price of one shilling.

In another pavilion Mr. George Ruff, a local water-colour artist, showed "Dioramas, Cosmoramas and Panoramas". The "Dioramas" consisted of a series of spectacular paintings exhibited in a darkened room with light thrown onto the pictures in such a way as to produce an optical effect which gave the appearance of reality. The forerunner of the three-dimensional cinema perhaps? The effects could be varied so as to represent both day and night scenes. One popular exhibit by Mr. Ruff was entitled: "The Castle of Falkenstein". This was probably a series of scenes aimed at recreating those spine chilling sensations which the Victorian viewer may have experienced when reading of the more famous "Frankenstein" of Mrs. Shelley (Fig 3). Also showing were "Panoramas" consisting of continuous scene pictures projected round the inner walls of a circular room, which were viewed from the centre by a promenading audience, (a form of entertainment still able to draw the crowds a century or so later to the Lawns in nearby Hove. The "Cosmoramas" or "Fairy Chromatropes" showing in yet another pavilion (not necessarily at the same time) were a constantly varied presentation. They seem to have consisted basically of coloured slides projected onto a large screen. The most popular subjects being dissolving views of scenes of the "Holy Land" and other well known "wonders" of the world. Other cosmoramas frequently shown were slides of "Houses and Gardens, including: Chatsworth House, Derbyshire, and other Stately Homes", many of which are still much in demand by the holidaying public of the present, although nowadays they actually drive through the wrought iron gateways in person. Other highly revered places visited daily on screen by the humble populace included such splendours as the "Twelfth Century Abbeys of Kirkstall, Yorkshire, and Dryburgh, Scotland", thus adding an ecclesiastical flavour to the proceedings ensuring its respectability; especially for Sunday afternoon performances. At other times the cosmoramas might show the night skies, with the relative positions of the stars and planets – a sort of early Planetarium! Whatever was shown would be accompanied by an "interesting and entertaining dialogue" spoken by Mr. Ruff. In addition to the coloured slides, the chromatropes employed various and diverse paraphernalia to obtain special optical effects, including that of a fountain "playing real water".

A Library and Reading Room containing "scrap

Fig 3. Mid-nineteenth century steel engraving entitled "View from the Castle of Falkenstein", Swiss Gardens. Marlipins Museum

Fig 4. Mid-nineteenth century steel engraving showing the junction of the East and West Lakes and the footbridge. Marlipins Museum

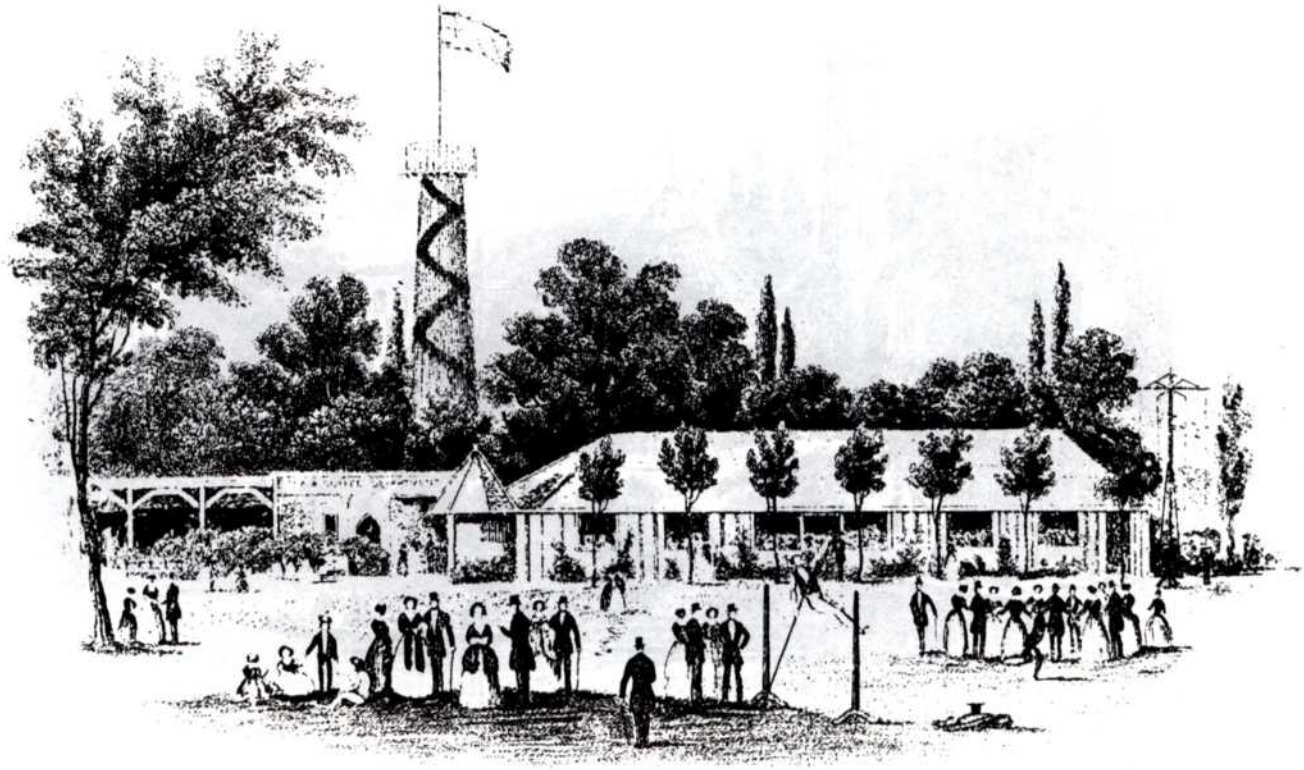


Fig 5. Mid-nineteenth engraving of part of the gardens. The building immediately in front of the tower bears the legend "TEA & COFFEE DEPARTMENT". Marlipins Museum

Fig 6. General view of the Gardens from Victoria Road with the new entrance pavilion of 1876 in the foreground. Marlipins Museum

books and albums" for the visitors' perusal, was housed in yet another pavilion. Here, there were also provided (all free of any charge): "many seated tables", with chess sets, draughtsmen and boards, for those who cared to use them, with an adjacent saloon containing facilities for bagatelle and Chinese billiards, and other "scientific games".

The Theatre at the Swiss Garden was said by a reporter to the *Illustrated London Times* in September 1858 to be: "Both neat and commodious". It contained private boxes, a pit and a large gallery. Other than the boxes there were no reserved seats and "first come first served" was the rule of the House. The first performance daily on stage began at two o'clock in the afternoon. This usually took the form of a "Vocal and Instrumental Concert", frequently including items known to be popular with the regular clientele such as: "The Smirking Maid", featuring "The Garden's very own, Mrs. W. Cooke"! At three o'clock, a "laughable farce" was presented. Between four and five in the afternoon coloured slides (of the type previously mentioned) were invariably shown on a large screen, while musicians played an accompaniment. The Ballroom or Main Pavilion, the immenseness of which has already been referred to, was probably (especially in the later years of the Garden's history) the most famous of the pavilions. As rebuilt to the designs of Arthur Loader in 1878 it was one hundred and fifty feet long and fifty four feet in breadth and was renowned for its tasteful appointments. There one could dance the night away to a "Quadrille Band" under the direction of the resident "Master of Ceremonies, Mr. E. Marshall".

Local organisations such as the Brighton Mechanics Institute would organise a "Fete and Days Outing" to the Swiss Gardens, followed by a "Grand Ball" in the evening. George Moore's novel *Esther Waters*, part of which was set in and around Shoreham, was first published in 1894, and in its early chapters the Swiss Gardens are referred to several times simply as: "the Gardens" or "the Pleasure Ground". In the book, one character says: " ... Ah, she must have gone to the Gardens ... those Gardens, ... Dancing Hall, theatre, sorcerers – every blessed thing. ... the jollifications culminated in a servants' ball ... and a great number had come from West Brighton, and Lancing, and Worthing – altogether between two and three hundred ... ". References of this kind tend to imply that the Gardens were solely the haunt of the "lower orders". Whilst that might have been increasingly so in the 1880s, when the Gardens were gaining a reputation of becoming the favourite place of a somewhat rough element, it was definitely not the case forty or fifty years earlier when the Grounds were catering for thousands of visitors daily.

The Gardens passed through a number of hands in the 1890s, the proprietors being Henry Boleno (1890), Hubbard & King (1899) and Ind Coope & Co. (1903). Sadly, the Gardens quickly became considered a place at which it was not "the thing" to be seen. They survived a few years more, but the knell had tolled, and at length this popular entertainment centre was closed. From time to time the theatre was re-opened for concerts and entertainments by local amateur groups, but never again did it throng with the noisy joyful masses as it had once done. By 1905 the entire gardens were closed to the public though the lake was still occasionally used for fishing. Mother Nature had her own way there. Some have said that at that time the Gardens were even more beautiful than when tended and manicured by a multitude of gardeners. Gradually though the brambles grew over the pavilions, windows were smashed, roofs caved in and walls crumbled. Nevertheless, the spirit of the place seemed determined to survive for as long as possible, being even in this ruined state a paradise playground for the local urchins for many years. Then came the building of the Council School and the generations of property developers.

The Swiss Gardens Public House (Fig 7) stands at what was one of the main entrances to the Gardens, and until a few years ago the entrance pavilion with its twin towers and timber facade, although changed, stood beside it. The tiny area of the original lakes and gardens that has managed to survive as an "open space" and not be covered by bricks and mortar or concrete, has been "cleaned up" and developed to serve as a "Beer Garden" to the Pub (Fig 2). Although the re-stocked, duck-populated, pond and grassed surround is but a faint shadow of the former Swiss Gardens, it is perhaps satisfying to know that what is left continues as some form of pleasure resort nearly one hundred and fifty years after the original conception.

SOURCES

The main printed sources consulted are:
Bull D.J. & Oliver, L.K., *Shoreham Memories* (1978)
Cheal, Henry, *The Story of Shoreham* (Hove 1921)
Kelly's Directory of Sussex (various editions)
Martin, Henry, *Brighton and its Environs* (1871)
Moore, George, *Esther Waters* (1894)
Norman, Michael, *A Walkabout Guide to Shoreham* (Shoreham, 2nd edn 1989)
Ward Lock & Co's *Illustrated Guide to Brighton* (1898 edition)

The author also acknowledges the assistance of the Marlipins Museum, Shoreham and the late Mr Griggs of Shoreham.

Fig 7. Swiss Cottage public house. Although not recorded in the directories until 1913, the 25" O.S. map (1898) shows a building of this extent on the site. Possibly the last surviving structure from the days of the Gardens. (Ron Martin)

PETER HOLTHAM

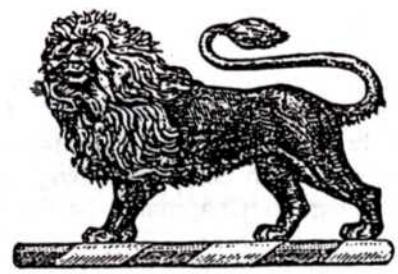
Seven Brighton Brewers

The early nineteenth century saw the emergence of the "common" brewer, that is one who brewed not for direct retail sale and/or consumption on his own premises but for sale elsewhere. Several factors contributed to this, the most significant being the invention of the steam engine in the previous century for use in pumping and operating the brewing machinery. In fact in 1834 a Doctor Wigan complained of the mist and smoke that hung over the central part of Brighton occasioned by the numerous steam engines belonging to the baths and breweries. Prior to the use of steam power breweries had been small concerns using man or horse power and thus restricting the size of their operations. A brew of 10 barrels (360 gallons), although sufficient for the needs of a publican supplying only his own customers, left little surplus for sales to other outlets. The steam engine and the coming of the railways made it possible for beer to be economically moved greater distances. For example beer brewed by Bass of Burton could be brought south for sale.

Between 1801 and 1831 the population of Brighton rose from 7,339 to 40,634, the number of inns from 40 to 89, although the number of brewers only doubled from 8 to 18. It was the Duke of Wellington's 1830 Beer House Act, intended to reduce drunkenness due to the excess consumption of spirits, that brought about the next change. Any householder upon obtaining a two guinea licence was permitted to retail beer which therefore became more readily available. The Excise duty on beer was abolished although retained on hops and malt. The situation continued for the next 39 years after which permission had to be obtained from the licensing justices to become a retailer of beer. Rather than promote numerous small breweries, this only helped to consolidate the established brewers in the town who went from strength to strength, buying up the beer houses and tying them into selling only their products. A report of an enquiry into the health of the inhabitants of Brighton in 1849 estimated that 49,053 barrels of beer were consumed annually.

By 1851 the population had risen to 65,569 and the number of licensed premises to over 200 although the number of brewers was still only 18. The beginning of cheap railway excursions to the town, if of little benefit to other tradesmen, certainly increased beer sales. The year 1870 saw the greatest number of brewers in operation 24 being listed, although during the century there had been 57 different brewing sites. It was the reintroduction of the beer duty in 1880 that started the decline in numbers by removing the less efficient. The number was down to 10 at the close of the century. Death duties, better cheap transport, the Great War, more expensive labour and repeated commercial take overs in the present century reduced the numbers further until only two remained in 1930. Sadly all are now gone, although an interest in "real ale" has encouraged a few publicans to again brew their own beer.

THE BLACK LION BREWERY



The Black Lion Brewery in Black Lion Street has been incorrectly attributed to Deryk Carver the protestant martyr burnt at the stake in Lewes for his religious beliefs in 1555. Carver was most likely an innkeeper who kept the "Black Lion" inn, named after the black lion of Flanders, on the east side of the street to which it gave its name. This inn was demolished earlier last century.

It now appears that the brewery was built after 1744 when William Hicks, who owned the "Old Ship", acquired property in Black Lion Street. The brewery was sold to William Chapman soon after 1770 being described as a common brewhouse and large malthouse. The malthouse was opposite the brewery and was demolished about 1888 when a new house had been opened next to Hove railway station in Conway Street. A third house was in use in Carlton Row Brighton from 1883 until 1891. William Chapman was listed in 1800 as being a brewer at 38, Ship Street which was probably his home address at the rear of the brewery. Although Chapman died in 1823 the business continued to be run under his name by several successors:- John Buckman in 1828, Benjamin Davis 1831-54, Tombs & Hale 1855, Hale & Fellows 1859-61, Hale & Oxenham 1863-74, Hale & Baily 1875-77 and the "Black Lion Brewery" until 1901 when the proprietorship was not listed. Brewing ceased in 1901 and the public houses were bought by the Rock Brewery of Brighton together with the Hove malthouse. The brewery building was first used as stores, and then after standing empty was acquired by Fremlin

Brothers the Maidstone brewers in 1914 who used it as a bottling stores until demolition in 1968. The malthouse in Hove passed from the Rock Brewery to the Kemptown Brewery in 1913 and the Portsmouth & Brighton United Breweries in 1933, being demolished under the ownership of Brickwoods in about 1970.

The original brewery building was three old tenements with dormer windows and a roof of Horsham stone. It is not certain when the brewing tower was added to the rear, reached by a small yard, but this was probably when steam power was added after Chapman's death. Little of the building remains today except for a portion of the north wall in Black Lion Lane and a partial reconstruction of part of the original brewery.

Notable Chapman & Co public houses were the "Hand in Hand" in North Road, the "Noah's Ark" also in North Road, the "Southern Cross" Portslade and the "Warwick Arms" in Ann Street Worthing which even today bears the legend "Chapman & Co Brighton Ales"

THE WEST STREET BREWERY

This was the next oldest brewery in Brighton situated at 8, West Street on the site of the old militia barracks and reached through an archway on the west side of the street next to the old "Kings Head". It was established in 1767 by Isaac Grover who owned the "Seven Stars" and whose grandfather had brewed in North Street in the previous century.

In 1770 Grover took on as partners Robert Killick and James Bucknoll following an auction of "a part of that new brewhouse, malthouse, storehouse, coalyard, brewing utensils, stock in trade also part of six well accustomed publick houses. The purchaser will be admitted a partnership in the brewing and coal business." After the death of Grover in 1789 the business was run by a partnership of Robert Killick and James and John Vallance passing to the Vallance family at the end of the century.

The brewery was the first in Brighton to use steam power. In 1814 John Vallance patented an apparatus for cooling brewing worts and in 1820 a method and apparatus for packing hops. The Vallances built a malthouse in 1816 at Southwick close to the lock gates. This survives in use by the Sussex Yacht Club. A larger house was built in Shoreham in 1844. The company imported coal and barley through the port and probably shipped out malt.

The business continued after 1833 in association with William Catt the proprietor of the Bishopstone tidemills whose son Henry changed his surname to Willett. The Vallances ceased their connection with the brewery in c.1870 although it continued to trade as "Vallance and Catt" under the Catt family until named the "West Street Brewery" in c.1890. Twenty one of the Catts licensed houses were sold to Tamplins in 1899. In 1850 the business of George Wigney whose brewery was at 21, Ship Street was acquired following the failure of the Wigney banking business. In c.1878 the public houses of the Preston Brewery of J Brooks in Preston Village were taken over. Brooks' malthouse still survives in a ruined state to the rear of the "Brewery Tap" in South Road.

Brewing ceased in West Street just prior to the Great War when the business was amalgamated with that of Smithers & Sons who operated the North Street Brewery. The premises were demolished when West Street was widened in the 1930s and most of the buildings on the west side were razed. The Ice Stadium was later built on the site. The malthouse at Kingston, Shoreham survived until 1971 having passed into the hands of the Kemptown Brewery.

THE CANNON BREWERY

A short distance to the north west of the West Street Brewery was the Cannon Brewery founded by John Barnet. This commenced business in a small house in Russell Street at what the *Sussex Daily News* in an article in 1907 put as the dawn of the nineteenth century. So unpretentious was his start that he took out on a truck the beer which his wife helped him to brew. Owing to the excellence of his product his business prospered so rapidly that in 1821 he was able to build on the opposite side of the road the premises which became the imposing block of buildings known as the "Cannon Brewery".

On the death of Barnet in 1870 the brothers John and Frederick Kidd purchased the brewery and carried on the business until 1884 when Frederick died and was replaced by Herbert Hotblack. The company continued as Kidd & Hotblack even after the death of John in 1897.

In 1876 the nine licensed premises of Ambrose Warde and William Thompson who had previously brewed at 93, Carlton Hill, and since 1874 at the "Star Brewery" 37-8, Church Street, were acquired. The Star premises survived until 1974 to the south of the Throat and Ear Hospital under the ownership of Parsons & Son tarpaulin manufacturers.

When Arthur Wagner built the Church of the Resurrection adjoining the Cannon Brewery, the brewers successfully objected to the proposed height, claiming ancient lights. Wagner was forced to build downwards and had the ground excavated to such a depth that the church was approached down 32 steps. The church was opened in 1878 and closed in 1912 when it was converted into a wholesale meat store. Ironically in 1965 Messrs Tamplins took it over as a beer store although it was demolished soon afterwards,

Kidd and Hotblack went into voluntary liquidation in 1926 and the 52 licensed premises were acquired by Messrs Tamplins & Son who retained the brewery as a bottling store until 1969. The site is now covered by a multi-storey car park.

Most of the public houses were painted red and black with small Georgian windows. One, the "Wick Inn" in Hove, until recently still announced "Red House Ale" in its stained glass windows.

THE ROCK BREWERY

The precise date when the Rock Brewery was founded at 61, St. James's Street is uncertain although it was described as "newly erected" in a sale notice of 1809. Early owners were Herriot & Palmer in 1822 and Richard Palmer who went bankrupt in 1824 when the brewery was auctioned and purchased by Rowe and O'Connor. They were listed as brewers in 1828-32 although only as Elizabeth O'Connor in 1839. John Horne was the brewer in 1843-5 and Griffith & Co in 1846-52. John Stonehouse Griffith, the part owner, was robbed and murdered by persons unknown near Dale Hill in 1849 as he returned from collecting orders. Thrupp & Co. had the brewery 1853-4 but by 1856 it had finally passed into the Catt and related Willett family. In 1928 the business was amalgamated with the Portsmouth and Brighton United Breweries Ltd and brewing ceased, the premises being used as a depot. The premises were finally demolished in 1978.

Malting was carried on in malthouses in Hereford Street and Warwick Street. When brewing ceased the former became a bottling department and the latter a transport garage. Many of the former public houses exist still bearing the legend "Rock Ales" either on the wall or in the stained or etched glass work.

Like many companies the Rock grew by taking over others. The College Brewery in nearby Montague Place was acquired in 1900, the Black Lion in 1902, the West Street Brewery Horsham of Henry Michell in 1912, the Tipper Ale Brewery Newhaven of Charles Towner in 1911, the Steyning Breweries after a fire there in 1917 and the Walburton Brewery of Ellis and Son in 1922.

Nothing of the brewery or malthouses remain today. The brewery site is now covered by Lavender House and St. Mary's Church House.

THE NORTH STREET BREWERY

This brewery situated at what was 89-90, North Street was founded by R & C Chandler prior to 1822 when it was first listed. The 1824 rate book lists only R. Chandler, having a brewery, malthouse, corn store and stable. The directories for 1828-33 show Eliza Chandler. The first mention of the Smithers family, the ultimate owners, was in 1839 when Henry Smithers is shown in partnership with Thomas Isaacson. From 1861 W.H. Smithers was the brewer joined by a son in 1864.

The brewery stood in an area now occupied by Marks & Spencer with an office at 201, Western Road, the old brewhouse fronting onto what later became Dyke Road next to the Swan Downer school. The brewhouse survived until 1984 having been used by the motor trade since 1924 and more recently as a furniture warehouse. A date on the wall referred to a rebuilding in 1900. A bottling store and stables were at 22, Regents Hill, premises that survived until 1980 as Johnsons furniture store.

Smithers acquired the business of Ashby & Co. in 1906 selling off their brewery at 28, Sillwood Street which survived until recently as a garage. Ashby's malthouse at 40, Cheltenham Place was retained and used until 1913, after which it became a grocer's warehouse and more recently a tee shirt manufacturer. It is now in poor condition and awaits possible demolition. A Louis Cecil Ashby became a director of Smithers.

The North Street Brewery amalgamated with the West Street Brewery in 1913, Percy Arnold Willett and his sons Kingsley and Robert becoming directors. Malting was transferred to their malthouse at Kingston in Shoreham.

The business of Couchman & Co at Hurstpierpoint was also acquired in 1913. Most of this brewery survives as the Maxim Lamp Works.

In 1919 Smithers took over the business of the Southdown Brewery at Portslade founded in 1849 by John Dudney and later operated by the Mews family. Brewing was transferred from Brighton to these enlarged and modernised premises in 1920 and production continued until 1929 when the company was taken over by Messrs Tamplins. The plant was auctioned off in 1930. Most of the Portslade brewery building remains under the ownership of Le Carbone. One third of the licensed houses were sold on to the Kemptown Brewery together with the Kingston malthouse.

THE PHOENIX BREWERY

By far the largest and most famous brewery in Brighton was Tamplin's Phoenix Brewery in Richmond Terrace. In 1820 Richard Tamplin purchased a small brewery in Southwick from a Nathaniel Hall. Unfortunately shortly afterwards it was destroyed by fire with a loss of over £10,000. Remains of a flint wall can still be traced in Southdown Road.

A new brewery was begun in February of the following year in Brighton, the foundation stone being laid by Henry Pagden Tamplin the brewer's eldest son. It was this building, rising from the ashes albeit on a different site, that became the "Phoenix", soon the largest brewery in the county. By 1902 Tamplins had occupied an area of 100,000 square feet and were employing 150 men.

The business expanded by the acquisition of several smaller concerns. In 1892 the nearby Albion Brewery in Albion Street was purchased from Marcellus Castle. This had been founded in c.1854 by William Clarke. These premises were retained as a wine, spirit and bottled beer store and survived until 1982 as a builders store next to the "Stable Inn"

bearing the legend "Albion Brewery" on the stone work until the end.

In 1899 the licensed houses of the Catt family were purchased and in 1900 the South Malling Brewery at Lewes was purchased from Bishop & Sons. Also in 1900 the 12 houses of the Brighton Brewery at Osborne Street, Hove were purchased from R.C. Weeks, the brewery being retained for a short time as a store. Messrs Moss Brothers (Cobleys) now occupy the site the only evidence of former ownership being a metal plate with Tamplin's name on the wall.

A further take-over was the Southdown & East Grinstead Breweries' premises at Lewes in 1920 where the malthouse was retained to replace an older house in Southover Street, Brighton which became a wine and spirit store.

In 1926 the business of Kidd & Hotblack was acquired and in 1928 two thirds of the licensed premises of the Hove brewers E. Robins and Sons. In 1929 two thirds of the premises of Smithers were purchased. Finally in 1955 the business of Henty & Constable of Chichester was purchased although the brewery building and half of the public houses were resold to Friary Holroyd of Guildford. By the early 1950s Tamplins owned two thirds of all the licensed premises in the Brighton area.

Tamplins themselves were taken over by the London brewers Watneys in 1953 although the business continued to trade as Tamplins for some time. The last brew was in November 1973. The brewery was demolished in 1980 although much of the bottling and storage buildings survived when the premises became a distribution depot. A move to Lewes in 1991 will mean the demolition of the remaining buildings. The name "Phoenix" has been revived recently on many of the public house signs replacing the earlier "Red Barrel" although there are still many that claim "Tamplins Entire" on their walls.

THE KEMPTOWN BREWERY

The last of the larger Brighton Breweries to open was the "Bristol Brewery" founded in about 1839 by William Hallett at 6 Seymour Street. Hallett was responsible for the building of much of Kemptown including the church of St. John the Baptist and the Bristol Hotel (now Bristol Court) named after the Marquis of Bristol who lived nearby in Sussex Square.

William Hallett was mayor and magistrate in 1855, offices held also by his son William after his father's death in 1862. In 1854 the business was run as a partnership by Hallett and Abbey and after 1891 as Abbey & Sons. The name Kemptown Brewery was not adopted until 1908. The building occupied a site either side of Seymour Street south of St. Georges Road. A large malthouse was at the southern end of Sutherland Road.

The business expanded by the acquisition of the licensed houses of Henry Longhurst in 1889 following the death of the owner in 1888. Longhurst's Amber Ale Brewery was situated to the north of Preston Circus where the old malthouse survives converted into the "Duke of York" cinema. The fire station covers the site of his brewery. In 1914 the business of Young & Rawley of Eastbourne was acquired and in 1924 that of the Adams Tower Brewery of Worthing whose building remains in Warwick Street to this day. Further purchases were in 1928 one third of the properties of E. Robins of Hove, and in 1929 one third of the properties of Smithers.

The company itself was taken over by the London brewers Charringtons in 1954. Brewing ceased in April 1964 and the premises were demolished by 1970. The site is now completely covered by flats and Seymour Street is no more.

The name Kemptown Brewery however lives on because the landlord of the "Hand in Hand" in Upper St. James's Street obtained permission to use the name and has installed a small brewing plant to provide "Kemptown Bitter" for his customers.

In compiling these notes I am indebted to Eric Dore and Keith Osborn of the Labologists Society for the bottle labels, Sue Berry for the information on the Black Lion Brewery, the Phoenix Brewery for access to their deeds and the Brighton and Hove libraries for trade directories and rent books.

D. PATERSON,

with additions by D.H. COX and the SUSSEX MILLS GROUP

A Bibliography of Sussex Mills

The original list was compiled by D. Paterson and issued as *North West Mills Group Circular No. 6.* Since then the list has been extended with the assistance of D.H. Cox and the committee of the Sussex Mills Group.

This bibliography excludes material relating to mills concerned with the iron industry. For information on this aspect readers are advised to consult:

Henry Cleere & David Crossley, *The Iron Industry of the Weald* (Leicester 1985)
H.R. Schubert, *History of the British Iron and Steel Industry* (1957)
Ernest Straker, *Wealden Iron* (1931, reprinted 1969)
Bulletin of the Wealden Iron Research Group

ADORIAN, P., *Gibbons Mill* 1970, 23pp illus.

ANDERSON, Arthur Henry, "Sussex Windmills in the Early Nineteenth Century, an Inventory compiled from the first Ordnance Survey", *Sussex County Magazine* Vol. 9 pp180-4, T.R. Beckett Ltd., Eastbourne 1934, 5pp illus.

ANNETT, I.P., *Oldland Mill, Keymer*, Hassocks Amenity Association 1980, 1pp illus.

ANON., *Shipley Mill: Millwrights, Grist & Steele, Engineers, Horsham*, WSCC. Chichester 1966, 4pp illus.

ANON, *A Guide to Shipley Mill 1879-1979*, Centenary edition 1977, 5pp illus.

ANON., *Bartley Mill, Bells Yew Green*, Bartley Mill 1987, pamphlet, 8pp illus.

AUSTEN, B., *Windmills of Sussex: A Guide to fourteen Sussex windmills*, Sabre Publishing 1978, 32pp illus. map.

AUSTEN, B., COX, D.H. & UPTON, J. (Ed), *Sussex Industrial Archaeology: A Field Guide*, SIAS. Phillimore 1985, 99pp illus. map. [Includes many mills.]

AUSTEN, B.H., *Seven Sussex Windmills*, 1977

BAINES, J. Mainwaring, "The Last Hastings Windmill", *Sussex County Magazine* Vol. 27 pp 232-3, T.R. Beckett Ltd., Eastbourne 1951, 2pp illus.

BAINES, J. Mainwaring, *Historic Hastings*, 2nd edn with addenda, F.J. Parsons Ltd. 1955, 437pp illus. [Chapter 35 "Windmills" pp268-73, illus. map]

BATTEN, M.I., *English Windmills* Vol. 1: Containing a history of their origin and developments, with records of mills in Kent, Surrey and Sussex. Architectural Press 1930, 128pp illus.

BARCLAY-WILLS, *Downland Treasure*, Methuen & Co. 1929, illus. [Includes an article on Ashurst Mill which is repeated in:

BARCLAY-WILLS (Ed) et al., *The Downland Shepherds*, Alan Sutton, Gloucester 1989, pp148-50 illus.

BECKET, Arthur, "The Decline of the Windmill", *Sussex County Magazine* Vol. 3 pp700-25, T.R. Beckett Ltd., Eastbourne 1929, 25pp illus.

BEEDELL, Suzanne, *Windmills*, David & Charles 1975, pp20-1, 24-43, 52, 56-7, 64, 89, 104-5. illus.

BENNETT, R and ELTON, J., *History of Corn Milling*, Vol. 1 Handstones, Slave and Cattle Mills 1898, 246pp illus; Vol. 2 Watermills and Windmills 1899 344pp illus.; Vol. 3 Feudal Laws and Customs 1900, 300pp illus.; Vol. 4 Some Feudal Mills 1901, 226pp illus. Simpkin Marshall, London. [Sussex: 2 pp133-4, 3 p35.]

BESWICK, M., "Park Mill, Burwash: A History", *Sussex Industrial History* No. 7 Spring 1976, pp7-13 SIAS. 1976, 7pp

BETJEMAN, J. & GRAY, J.C., *Victorian & Edwardian Brighton from Old Photographs* Batsford Ltd. 1973. [Windmills 117-22]

BLACKENEY, R., "The Mills at Fishbourne", *Sussex Arch. Society Newsletter* No. 26 Dec 1978, pp162-6, SAS. Lewes, 5pp illus.

BLACKWELL, J.S.F., "Clayton Windmills (Jack and Jill): Pt.2 Restoration", *Sussex Industrial History* No. 10 1980, pp18-23 SIAS. 6pp illus.

BLACKWELL, J.S.F. et al., "Cobb's Mill", *Sussex Industrial History* No. 11 1981, pp2-9 SIAS. 8pp illus.

BLAXLAND, John, "The Era of the Millstone", Sussex County Magazine Vol. 30 pp 315-20, T.R. Beckett Ltd., Eastbourne 1956, 6pp illus. [Woods Mill]

BRACHER, P., "Ifield Mill, its Owners & Occupiers", *Sussex Family Historian* Vol. 2 No. 7 pp222-8, Sussex Family History Group 1976, 7pp

BRANGWYN, Frank & HAYTER, Preston, *Windmills*, Bodley Head, 1923, 126pp illus. [Sussex pp46-51, 109-14]

BROWN, R.J., *Windmills of England*, Robert Hale 1976, 483pp illus. [Sussex pp194-238]

BRUCE, Maud Montague, "Regulation of Speed in a Windmill", *Sussex County Magazine* Vol. 15 pp 4-7, T.R. Beckett Ltd., Eastbourne 1940, 4pp illus.

BRUNNARIUS, Martin, "Clayton Windmills (Jack and Jill): Pt.1 History", *Sussex Industrial History* No.10 1980, pp8-18 SIAS 13pp illus.

BRUNNARIUS, Martin, *The Windmills of Sussex*, Phillimore, Chichester 1979, 211pp illus.

BRUNNARIUS, Martin, *Clayton Windmills: Help to Restore Jill,* Jack & Jill Preservation Society 1980, 12pp illus.

BRUNNARIUS, Martin, "Jesse Pumphery, Millwright", *Sussex Industrial History* No. 17 SIAS. 1987, 9pp illus.

BUCKLAND, J.S.P,, "The Punnetts Town, Heathfield Wind Saw Mills", *Sussex Industrial History* No. 21 SIAS. 1991, 7pp illus..

CASEBOW, Peter, "Trouble at t'mill", *Woodworker* Vol. 91 No. 6 June 1987, pp 524-9 Argus Specialist Publications Ltd., 6pp illus. [High Salvington Mill]

COX, D.H., "William Cooper – Millwright and Engineer (1825-76)", *Sussex Industrial History* No. 20 pp2-14, SIAS. 1990, 13pp illus.

CRANFIELD Mary, "More about Sussex Windmills", *Sussex County Magazine* Vol. 3 pp775-8, T.R. Beckett Ltd., Eastbourne 1930 4pp illus.

CRANFIELD Mary, "More Sussex Windmills", *Sussex County Magazine* Vol. 4 pp738-44, T.R. Beckett Ltd., Eastbourne 1930, 7pp illus.

CROCKER, G., *Gunpowder Mills Gazetteer: Black Powder Manufacturing Sites.* SPAB. Occasional Publication No. 2 Wind and Watermills Section, London 1988, 57pp illus. map [Sussex pp26-8]

DAWES, H.T., "The Windmills & Millers of Brighton", *Sussex Industrial History* No. 18 pp1-28 SIAS & Brighton Polytechnic 1988, 28pp illus.

DE-LITTLE, R.J., *The Windmill: Yesterday and Today*, John Baker 1972, 104pp illus.

DEMAUS, Robert, *Lurgashall Mill: A Description of the Mill and its History,* 8pp illus. 1978.

DOLMAN, Peter, *Sussex Windmills*, PD Xerox Printing 1976, 5pp map

DYMOND, J.B., "A Thousand Years of Milling at Petworth", *Sussex County Magazine* Vol. 27 pp428-30, T.R. Beckett Ltd., Eastbourne 1953, 3pp illus.

EDGELEY, C.R., "Wooden Windmills of West Sussex", *Sussex Life* March 1970, pp38-9, Kent Messenger Group 1970, 2pp illus.

EDGELEY, C.R., "Tower Windmills of West Sussex", *Sussex Life* 1970 pp30-32, Kent Messenger Group 1970, 2pp illus.

EDGELEY, C.R., "Post Windmills of East Sussex", *Sussex Life* November 1972, pp26-8, Kent Messenger Group 1972, 2pp illus.

EDGELEY, C.R., "Smock Windmills of East Sussex", *Sussex Life* May 1973 pp46-8, Kent Messenger Group 1973, 2pp illus.

EDGELEY, C.R., "Sussex Paper Mills", *Sussex Life* February 1974 pp41-4, Kent Messenger Group 1974, 4pp illus.

EVANS, A.A. Rev., "A Countryman's Diary", Sussex County Magazine Vol. 15 pp354-9, T.R. Beckett Ltd., Eastbourne 1941, 5pp illus. Slipper Mill.

FARRANT, Sue, "Bishopstone Tidemills", *Sussex Arch. Collections* Vol. 113 1975, pp199-202, SAS. Lewes 1975, 4pp map.

FOWELL, G.M. & HUGHES, A. Foord, "Windmills in Sussex", *Walker's Quarterly* Nos. 29-30, Walker's Galleries 1930, 34pp illus.

FREESE, S., *Windmills & Millwrighting*, Cambridge UP 1957, 104pp illus.

FULLER, M.J. & SPAIN, R.J. *Watermills*, Monograph series of the Kent Archaological Society No. 11 KAS. 1986, 203pp illus. Covers Kent and the borders of Sussex.

GARDENER, E.M., "South Mill, Midhurst", *Sussex Notes & Queries* Vol. 14 pp10-15, 233-5 SAS. Lewes 1954.

GARDENER, E.M., "Bex Mill, Heyshott", *Sussex Notes & Queries* Vol. 14 Nov 1956 pp181-2, SAS. Lewes 2pp

GIBSON-HILL, J & HENBERY, E.W., "The Reconstruction of Ifield Mill, Pt. 1: Historic Background", *Sussex Industrial History* No. 8 1978, pp12-16, SIAS. 1978, 4pp illus.

GIBSON-HILL, J & HENBERY, E.W., "The Reconstruction of Ifield Mill, Pt. 2: Restoration", *Sussex Industrial History* No. 9 1979, pp2-7, SIAS. 1979, 7pp illus.

GREGORY, F.W., "Rowner Mill", *Sussex Notes & Queries* Vol. 16 No. 6 pp202-3, SAS. Lewes 1965

GREGORY, F.W., "Bine Mill", *Sussex Notes & Queries* Vol. 17 No. 7 May 1971 p233, SAS. Lewes 1971.

HALL, Helena, "Fletching Mill", *Sussex County Magazine* Vol. 30 pp349-50, T.R. Beckett Ltd., Eastbourne, 2pp illus.

HARGREAVES, M., *Windmills and Watermills Open to View*, SPAB. Wind & Watermill Section 1984, 56pp illus. [Sussex pp16-17, 45-46]

HARRIS, R (Ed), *Weald & Downland Open Air Museum Guidebook*, WDOAM. 1978, 5pp. [Contains details of mills in the museum]

HARRISON, F., "Oldland Mill & Museum", *Sussex Notes & Queries* Vol. 3 1931 pp197-201, SAS. Lewes 1931, 5pp illus.

HASELFOOT, A.J. "The Restoration of Park Mill (Batemans, Burwash)", *Sussex Industrial History* No. 7 1976, pp13-21, SIAS. 1976, 9pp illus.

HASELFOOT, A.J., *The Batsford Book of Industrial Archaeology of South-East England,* Batsford Ltd., 1978, 153pp illus. [Includes many mills in Sussex]

HAYDEN, Roger, *A Guide to West Blatchington Windmill*, Friends of West Blatchington Windmill 1982, 14pp illus.

HAYNES, H.W., "Sidlesham Tide Mill", *Sussex Notes & Queries* Vol. 11 No. 6 May 1947, p133 illus. SAS. Lewes 1947.

HAYWARDS HEATH DISTRICT SCOUT CAMP, "A Water Driven Estate Water Pumping Plant at Buckhurst Park, Withyham", *Sussex Industrial History* No. 8 1978, pp10-12, SIAS. 1978, 3pp illus.

HEMMING, Peter (Rev), *Windmills in Sussex: A Description of the Construction & Operation of Sussex Mills*, C.W. Daniel 1936, 138pp illus.

HENBERY, E.W., *Ifield Mill Restoration*, Crawley Museum Society Publication No. 1 2nd edn. 1977, CMSP. 8pp illus.

HOATHER, R., "Chailey Windmill c1590-1865", *Sussex Genealogist & Local Historian*, Vol. 4 No. 1 1982, 8pp illus.

HOFFMAN, Spencer, "The Passing of Birdham Mill", Sussex County Magazine Vol.11 pp413-7, T.R. Beckett Ltd., Eastbourne 1937, 5pp illus.

HOLDEN, E.W., "The Excavation of a Motte at Lodsbridge Mill, Lodsbridge", *Sussex Archaeological Collections* Vol.105 pp103-25, SAS. Lewes 1967, 2pp

HOLDEN, E.W., "Horsebridge Watermill", *Sussex Industrial History* No. 10 1980 pp27-30, SIAS. 1980, 4pp illus.

HOLDEN, E.W., "Ancient Windmill Site at Glynde", *Sussex Arch. Collections* Vol. 113 1975, pp191-2, SAS. Lewes 1975, 2pp

HOPKINS, R. Thurston, *Old English Mills & Inns*, C. Palmer 1927, 276pp illus. map.

HOPKINS, R. Thurston, *The Lure of Sussex*, Cecil Palmer 1928. [Chapter XIV Windmill Days, pp126-39]

HOPKINS, R, Thurston, Windmills,, Charles Clarke 1931, 25pp illus.

HOPKINS, R, T. & FREESE, S., *In Search of English Windmills*, 275pp illus. [Chapter XVII West Sussex Mills]

HOPKINS, R. Thurston, *Old Watermills & Windmills*, Philip Allen 1934, 292pp illus.

HOPKINS, R, Thurston, *Old Watermills & Windmills*, E.P. Publishing reprint 1976, 245pp illus. [Ancient forgemills in Sussex pp151-66, Some Sussex Windmills pp179-206, Brighton Windmills by W. Law pp207-22]

HUDSON, T.P., "Burton Mill, Petworth", *Sussex Industrial History* No. 10 1980, pp2-8, SIAS. 1980, 7pp illus.

JENNER & HIGGS, *Centenary Year 1856-1956.* Haywards Heath Mill.

JOHNSTON, G.D., "Rowner Mill", *Sussex Notes & Queries* 1965 No.5 pp144, 147-9 SAS. Lewes 3pp illus.

JOHNSTON, G.D., "Bine Mill, Storrington", *Sussex Notes & Queries* Vol. 17 No. 6 Nov 1970, pp190-1, SAS. Lewes 1970.

LANE, L.G., "Sussex Water Mills", *Sussex County Magazine* Vol. 5 pp534-7, T.R. Beckett Ltd., Eastbourne 1931, 4pp illus.

LAW, William, "Our Windmills", *Brighton & Hove Archaeologist* No. 2 1924, Brighton & Hove Archaeological Club, 1924

LEWIS, R., *Scene in Sussex: A fresh look at the county*, The Research Publishing Co. 1972, 4pp. [Windmills on pp38-42]

LONGHURST, H., *My Life and Soft Times*, Cassell 1971, illus. Jack & Jill pp319-30

McCARTHY, Edna & Mac., *The Cuckmere – Another Sussex River*, The Lindel Publishing Co. Seaford 1981, 130pp illus.

McCARTHY, Edna & Mac., *Sussex River – Journeys along the banks of the River Ouse – Newhaven to Lewes*, Lindel Organisation Ltd. Seaford 1979, 68pp illus.

McCARTHY, Edna & Mac., *Sussex River – Journeys along the banks of the River Ouse Upstream from Lewes to the sources*, Lindel Organisation Ltd. Seaford 1979, 68pp illus.

McDERMOTT, R. & R., *The Standing Windmills of East Sussex*, McDermott Publicity Ltd. Worthing 1978, 46pp illus.

McDERMOTT, R. & R., *The Standing Windmills of West Sussex*, McDermott Publicity Ltd. Worthing 1978 , 46pp illus.

MAIS, S.P.B., *England of Windmills*, Dent 1931, 268pp illus. [Sussex mills pp1-46]

MAJOR, J.K., *Animal Powered Engines*, B.T. Batsford 1978, 169pp. [Sussex pp122-5]

MAJOR, J.K. & WATTS, M., *Victorian & Edwardian Windmills & Watermills from Old Photographs*, Anchor Press, Tiptree 1977.

MARTIN, E.A., *Life in a Sussex Windmill: with some amenities of the South Downs*, Allen & Donaldson 1920, 118pp illus. [Jack & Jill mills]

MASON, R.T., "Lost Mills of the Upper Ouse", *Sussex County Magazine* Vol. 14 pp374-6, T.R. Beckett Ltd., Eastbourne 1940, 3pp illus.

MINCHINGTON, W.E., "Tidemills of England and Wales" in *Transactions of the International Molinological Society*, 4th Symposium, Matlock, England, 1-8 Sept 1977, pp339-53 [lists 21 Sussex tide mills numbered 70-90]

NATIONAL TRUST, *Bateman's Park Mill*, National Trust 1976, 9pp illus.

NATIONAL TRUST, *Bateman's East Sussex*, National Trust 1976, rev. edn 1983 40pp illus.

NEVE, A.H., *The Conversion of a Windmill by a Descendant of the Old Miller*, Tonbridge Free Press Ltd., Tonbridge 1928. [Caldbeck Mill, Battle]

NEWNHAM, C.J., *History of Cross-in-Hand Windmill & of the Newnham and Ashdown Families*, ESCC. Planning Dept. Lewes 1979, 28pp illus.

NOMAD (pseud.), "The Vanishing Windmill", *Sussex County Magazine* Vol.1 No.10 pp421-5, T.R. Beckett Ltd., Eastbourne 1927, 5pp illus.

PADDON, J.B., *Windmills in West Sussex: a complete account of every windmill at present standing*, Oxonian Press Ltd. Oxford 1925, 16pp illus.

PADDON, J.B.,*Windmills in East Sussex: a complete account of every windmill at present standing*, Oxonian Press Ltd. Oxford 1926, 15pp illus.

PATERSON, D.S., "A Bibliography of Windmills and Watermills", *North West Mills Group Circular* No. 6, Xerox Printing February 1990, 6pp

PLATT, Judyth, "Sussex Windmills", photographs by, *The Countryman* Vol. V No. 1 Spring 1979, pp33-39

POTTER, Simon (compiler), *Clayton Windmills – Jack & Jill*, Society for the Preservation of Jack & Jill Windmills 1987, 56pp illus.

REID, Kenneth C., "Some Sussex Watermills", *Sussex County Magazine* Vol. 22 pp339-40, T.R. Beckett Ltd., Eastbourne 1948, 2pp illus.

ROBERTS, J & HALL, R., *A Guide to Stone Cross Windmill: History & Workings*, Stone Cross 1982, 16pp illus.

ROBINSON, Maude, "The Daily Bread of Old-time Sussex", Sussex County Magazine Vol. 14 pp356-61, T.R. Beckett Ltd., Eastbourne 1940, 6pp illus.

ROTTINGDEAN PRESERVATION SOCIETY, *Rottingdean Windmill* 1977, 8pp illus.

RUFF, Aubrey, "Sussex Millwrights: The Medhursts of Lewes", *Sussex County Magazine* Vol. 26 No. 1 Jan 1952, pp8-12, T.R. Beckett Ltd., Eastbourne, 5pp illus.

SHAW, A.K. & HAMLIN, K.W., *Nutley Windmill Restoration*, rev.edn. 1978, Uckfield District Council 24pp illus

SHILLINGFORD, E.A.P., *England's Vanishing Windmills*, Godfrey Cave Associates Ltd., London 1979, 159pp illus. [Sussex mills pp110-21, 124, 127, 128, 138, 141, 144, 145]

SHORTER, A.H., "Paper Mills in Sussex", *Sussex Notes & Queries* Vol. 13 No. 8 Nov. 1951, pp169-74 SAS. Lewes 1951

SHORTER, A.H., "Iping Paper Mill", *Sussex Notes & Queries* Vol. 13 No. 9 May. 1952, pp213 SAS. Lewes

SHORTER, A.H., *Water Paper Mills in England*, SPAD. (WWS) No. 9 London 1966, 20pp illus map. [Lists five mills in Sussex]

SILVER, Ray, "Past Monarch of the Air", *Sussex County Magazine* Vol.18 pp205-10, T.R. Beckett Ltd., Eastbourne 1943, 5pp illus.

SIMMONS, H.E.S., "The Windmills of Sussex", *Sussex County Magazine* Vol. 11 pp 38-41, T.R. Beckett Ltd., Eastbourne 1936 5pp illus.

SIMMONS, H.E.S., "The Windmills of Sussex", *Sussex County Magazine* Nov & Dec 1937 pp738-41 and 803-8, T.R. Beckett Ltd., Eastbourne 10pp

SIMMONS, H.E.S., "The Old Windmills of Lewes", *Sussex County Magazine* Vol. 15 pp242-53, T.R. Beckett Ltd., Eastbourne 1940, 12pp illus.

SIMMONS, H.E.S., "Sussex Watermills", *Sussex County Magazine* Vol. 21 pp80-6, T.R. Beckett Ltd., Eastbourne, 7pp illus.

SIMMONS, H.E.S., Collection of notes deposited at the Science Museum, photographs at English Heritage, London. [Copies of the Sussex notes are in Brighton Reference Library]

SKILTON, C.P., British Windmills & Watermills, Collins 1947, illus. [Sussex pp22-4]

SMITH, Arthur C., *Windmills in Sussex: a contemporary survey*, Stevenage Museum Publications, Stevenage 1980, 48pp illus map.

SMITH, N.C., "Pottens Mill", *Sussex Notes & Queries* Vol. 16 No. 3 May 1964 pp104-5 SAS. Lewes 1964

SOCIETY FOR THE PROTECTION OF ANCIENT BUILDINGS (Wind & Watermill Section), *Windmills and Watermills Open to View: a guide*, London 1986, 63pp illus. [Sussex mills pp16-9, 45-7]

SPAB (WWS), *Mills Open: Windmills and Watermills Open to the Public: A Guide,* London 1991, 86pp illus. [Sussex pp 54-7]

SPAB (WWS), *Windmills and Watermills Open to View* (Map 1:1,000,000) London 1986. [Thirteen Sussex Mills identified]

SOWAN, Paul W., "Thomas Durrant (Miller) of Merstham & Ifield", *Sussex Industrial History* Vol. 11 pp22-4 SIAS. 1981, 3pp

STEVENS, Lawrence (compiler), *Polegate Windmill: A Souvenir Guide*, Eastbourne & District Preservation Trust, Eastbourne 1967, 39pp illus. 2nd edn 1969, 3rd edn 1974, 4th edn 1980

STEVENS, Lawrence, "Friston & Eastbourne: some windmill sites", Sussex Archaeological Collections Vol.120 1982, SAS. Lewes. 46pp illus.

STEVENS, Lawrence, "Langney Tide Mill, near Eastbourne", *Sussex Arch. Society Newsletter* No.33 April 1981, pp233-4 SAS. Lewes 2pp

STRAKER, E., "Lost Mills of Ashdown", *Sussex County Magazine* Vol. 12 pp203-6, T.R. Beckett Ltd., Eastbourne 1938, 3pp illus.

STRAKER, E., "Lost Mills Around East Grinstead", *Sussex County Magazine* Vol. 13 pp383-7, T.R. Beckett Ltd., Eastbourne 1938, 5pp illus.

STRAKER, E., "Lost Mills of the Mole", *Sussex County Magazine* Vol. 14 pp83-5, T.R. Beckett Ltd., Eastbourne 1940, 3pp illus.

SUSSEX INDUSTRIAL ARCHAEOLOGY STUDY GROUP, *Newsletter* Nos 1-5, April 1968-April 1970. Notes on mills appear in each issue under "Power Survey" and elsewhere.

SUSSEX INDUSTRIAL ARCHAEOLOGY SOCIETY, *Coultershaw Beam Pump*, SIAS. 8pp illus.

SUSSEX INDUSTRIAL ARCHAEOLOGY SOCIETY, *Newsletter*, Nos. 1-73, January 1974 - January 1992 (continuing). Many issues contain short articles and notes on Sussex mills. Since issue 62 (April 1989) a section on mills and milling compiled by members of the Sussex Mills Group has been included in each issue.

SUSSEX ARCHAEOLOGICAL SOCIETY, *Sussex Notes & Queries* Vols 1-15 1909 - 70, SAS. Lewes. A number of the more important notes have been listed in this bibliography but others of shorter length have not. To locate these use the index volumes to *Sussex Archaeological Collections* 1874, 1914, 1936, 1966 or separate index volumes for *Sussex Notes & Queries.*

TERRY, Bertha, *Childhood Memories of Polegate Wind & Water Mills*, Polegate Windmill 1985, 10pp illus.

VINCE, J., *Discovering Windmills*, Shire Publications 1977. [Sussex mills pp50, 51 & 55 illus.]

WAILES, Rex, *The Windmills of England*, The Architectural Press 1948, pp 14, 40, 41 illus.

WAILES, Rex, *The English Windmill*, Routledge, Kegan Paul 1954, 246pp illus.

WAILES, REX, Tide Mills, Pt.I SPAB (WWS.) No. 2 (1955), 16pp illus. [Sussex pp10-11]

WAILES, Rex, Tide Mills, Pt.II SPAB (WWS.) No. 3 (1956), pp17-36 illus. [Sussex pp29]

WEALDEN DISTRICT COUNCIL, *Windmills & Argos Hill* (Mayfield), WDC. 1975, 69pp illus.

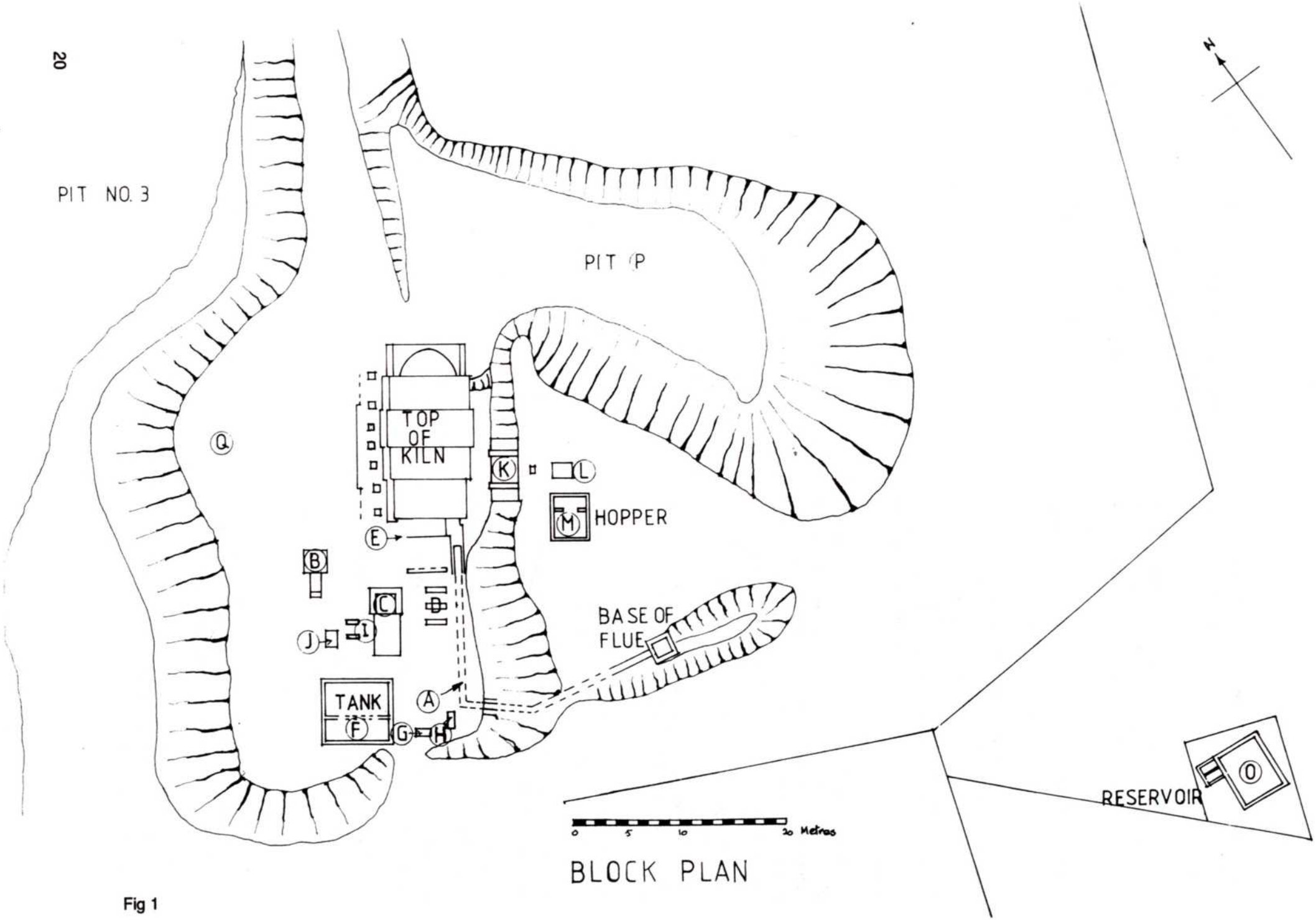
WENLOCK, Christopher, "The Restored Mills of Sussex", Sussex County Magazine Vol.12 pp514-20, T.R. Beckett Ltd., Eastbourne, 6pp illus.

WILLETT, Francis (Rev.), "The Tide Mill", *Sussex County Magazine* Vol. 8 pp376-9, T.R. Beckett Ltd., Eastbourne, 3pp illus.

WOODFORD, C., *Portrait of Sussex,* Robert Hale 1972 illus. [Sussex mills pp182-8]

WORTHING MUSEUM, *Salvington Mill* 1976, 16pp illus.

WRIGHT, Simon & GREGORY, Frank, *Nutley Windmill: A Short History & Guide*, Uckfield & District Preservation Society 1987, 29pp illus.


PIT NO. 3
PIT P
TOP OF KILN
HOPPER
BASE OF FLUE
TANK
RESERVOIR
A
B
C
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L
M
N
Q
0 5 10 20 Metres
BLOCK PLAN

Fig 1

R.G. MARTIN

Experimental Cement Shaft Kiln at Beddingham

BACKGROUND

The Society was invited in Summer 1989 by Blue Circle Industries Plc. to survey the kiln situated at their landfill site at Beddingham in East Sussex. It is their intention to demolish the kiln as there is danger of explosive gases accumulating in underground voids. The only access at that time was from the top by descending with ropes some 45 metres to levels '1' and '2'. An accurate survey of the top level '5' and a rough survey of the lower levels was carried out in December 1989 and January 1990, the work to the lower levels being carried out under considerable difficulties due to lack of natural light and bad air, thus limiting the time available on site. These surveys were drawn up and it was anticipated that no further investigation would be possible. In December 1990, the outer end of a tunnel at level '2' was exposed and easier access obtained. Furthermore a level '0' was discovered below level '1' together with another tunnel. A new survey of all lower levels has since been undertaken.

HISTORY

Portland cement was patented by Joseph Aspdin in 1824 being manufactured from a mixture of chalk and clay fired at a temperature of 1400°C. The use of Portland cement increased dramatically during the last part of the nineteenth century. As it was mostly made in intermittent kilns by the turn of the century an acute shortage had arisen. Continuous rotary kilns had been invented by that time, the first being patented in 1877. After various unsuccessful attempts had been made in this country they were being developed abroad making the large scale production of cement more economic. Rotary kilns were expensive both to construct and to maintain and the system of admixing the chalk and clay as a wet slurry meant that there was considerable wastage of fuel in the evaporation of the moisture before calcination could take place. In spite of this there were 68 rotary kilns in production in England and Wales in 1914 out of a total of 617 kilns and by 1927 the first 300 ft. rotary kiln had been built.[1]

Various individuals in the 1920s proposed methods of making cement by cheaper methods than by using rotary kilns. Vertical shaft kilns with few moving parts were suggested and Sir Percy Girouard designed one which was patented in 1926.[2] Sir Percy was born in Canada and had a distinguished career as a railway engineer with the Canadian Pacific Railway and later with the Royal Engineers in Egypt and the Sudan following Kitchener's campaign. Subsequently he was appointed Director of Railways in South Africa. He became Director-General of Munitions in 1915.[3]

Sir Percy's design (Fig 2) envisaged a vertical shaft constructed near the face of a quarry with the shaft narrowing towards the bottom where pulverised fuel would be supplied through nozzles. The powdered material for making the cement would be showered down from the top of the kiln and meet the upward flow of hot gases and the particles would be thoroughly burnt before passing into the lower cooling chamber where they would be removed and ground. This design of kiln used the "flotation" process of firing. Waste heat would be recycled and used in the process. Provision was made in the Patent for several shafts grouped around or in line with the kiln for the storage and drying of the raw materials. It is not known whether a kiln was built to this specification.

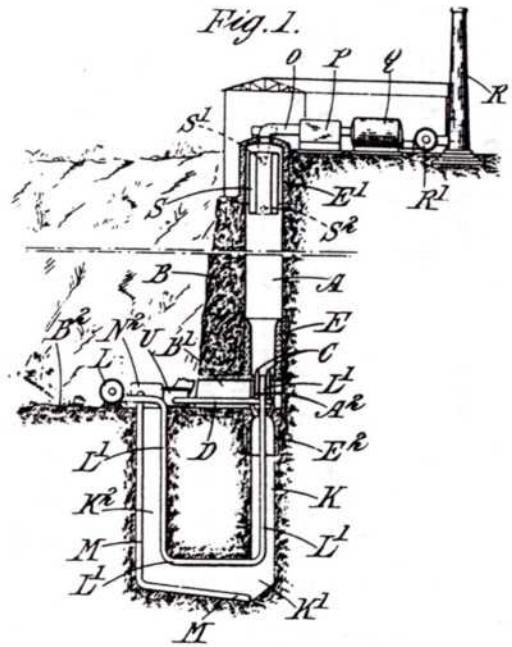
Dr. Geoffrey Martin, D.Sc., Ph.D., F.I.C. an eminent chemist and the author of many standard reference books on industrial chemistry, improved on the design of Girouard's Flotation Kiln and patented his own design in 1927.[4] This endeavoured to balance the upflowing hot gases with the descending raw materials and employed a cyclonic action with the upper part of the kiln widened toward the top. Pulverised dry raw material was arranged to be discharged into the kiln at the downward part of the gas movement. Exit gases were arranged to be drawn off on the same side as the entry of the raw material. The cross sectional areas of the respective parts of the kiln and the velocities of the gases were carefully calculated to achieve maximum calcination of the raw materials. The drawing acompanying the Patent (Fig 3) shows that fuel in the form of powdered coal was injected into the sides of the kiln at the bottom with a cooling zone beneath this. The advantage of the flotation kiln as anticipated by Dr. Martin was that the materials being in suspension were capable of being thoroughly intermixed without all the disadvantages of wet mixing. As compared with other shaft kilns the pre-heating zone and calcining zones were filled not with large blocks of material which impede the passage of hot gases but with small particles in suspension. This would allow large volumes of gases to pass at any given time and hence enabled a large output of clinker to be produced.

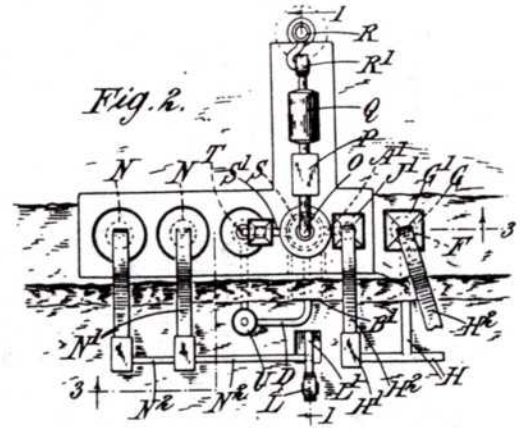
Dr. Martin built a large-scale experimental flotation kiln at Asheham in the parish of Beddingham near Lewes.[5] The land was acquired by the Asheham Company Ltd. and is in the vicinity of Asheham House, a pretty, early nineteenth century house in

Key

A – Vertical kiln shaft
A¹ – Raw materials passages
A² – By-pass passages for hot clinker
B – Face of quarry
B¹ – Working adit
B² – Ground level of quarry
C – Burners
D – Fuel pipes
E – Firebrick lining
F – Drying chambers or shafts
G – Raw material crushing apparatus
G¹ – Raw materials hopper
H – Raw materials conveyors
H¹ – Raw materials elevators
H² – Raw materials conveyors
J¹ – Raw materials hopper
J – Pulverising apparatus
K – Hot clinker chamber
K¹ – Communication gallery
K² – Shaft
L – Fan
L¹ – Hot gas ducts
M – Elevator
N – Storage silo
N¹ – Elevators
N² – Conveyors
O – Flue outlet
P – Dust collector
Q – Waste heat boiler
R – Chimney shaft
R¹ – Fan
S – Annular retort
T – Raw coal storage
U – Fuel pulveriser

[This Drawing is a reproduction of the Original on a reduced scale.]





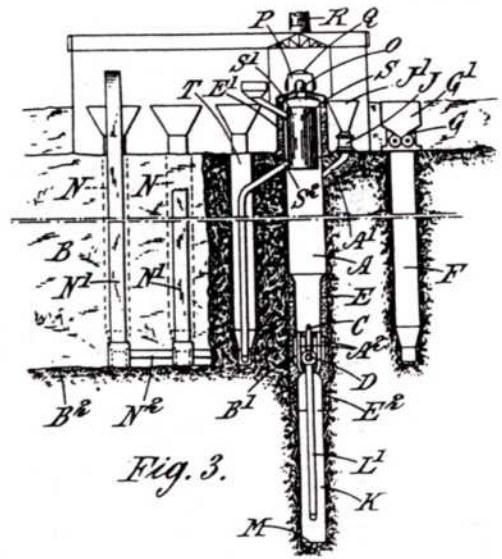


Fig 2. DRAWING ACCOMPANYING SIR PERCY GIROUARD'S PATENT NO. 260,684

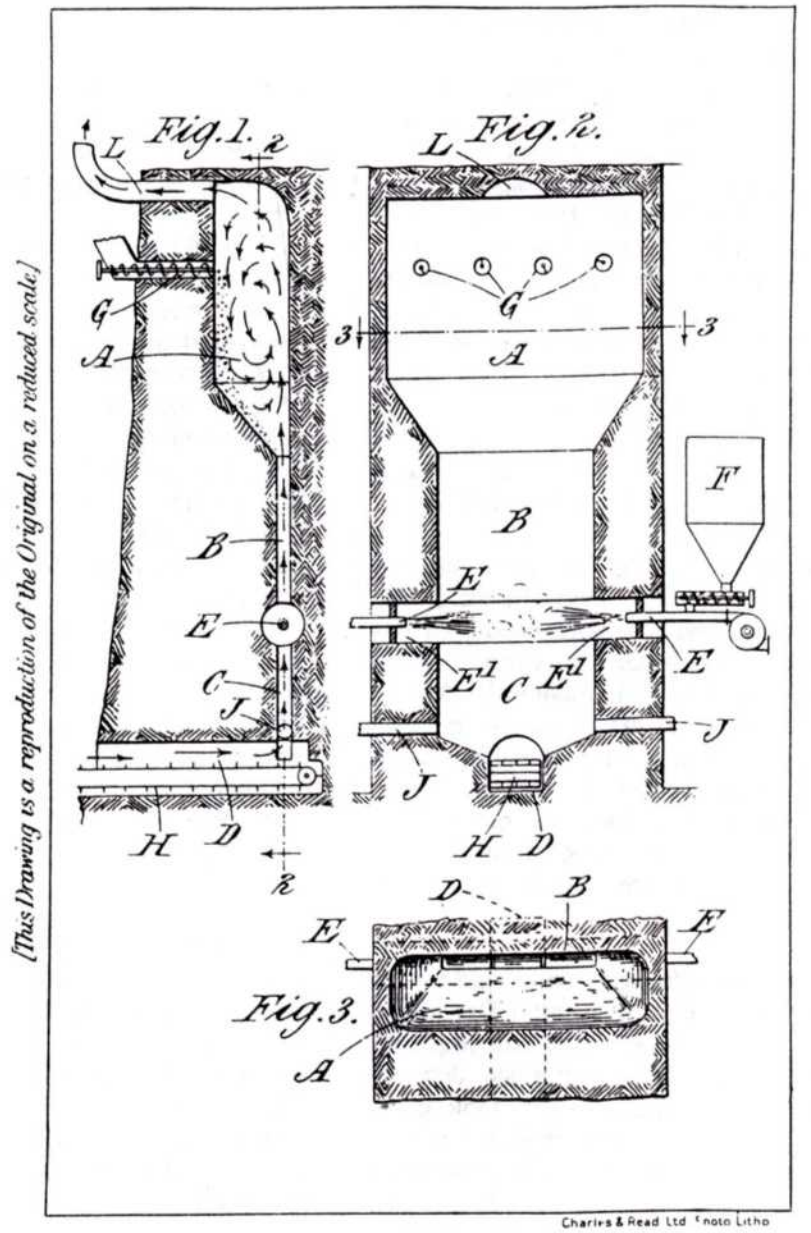


Fig 3. DRAWING ACCOMPANYING DR. GEOFFREY MARTIN'S PATENT NO. 276,066

Key

A – Preliminary heating or decarbonating portion
B – Clinkering or sintering zone
C – Cooling shaft or chamber
D – Adit to ground level
E – Burners
E^1 – Lateral apertures
F – Hopper for powdered fuel
G – Openings and conveyors for raw materials
H – Conveyor for withdrawal of hot clinker
J – Air supply pipes

Gothick style. (N.B. Sometimes spelt Asham). A previous famous occupant of the house was Virginia Woolf (formerly Virginia Stevens) who lived there between 1911 and 1919.[6] The experiment was financed by Charles F. Lumb, Sir Percy Girouard, Mr. Hamilton and S.R. Worley and was constructed in 1928 and 1929 (Fig 5). All the excavations and tunnels were carried out by hand and the equipment was manhandled into position. The kiln that was built at Asheham was substantially similar to that shown in Dr. Martin's Patent. It is also described in his book and the drawing of the kiln accompanying this is virtually as built (Fig 4). The main differences between this and the Patent are that the plan shape which in the Patent was rectangular is now oval and the upper part of the kiln previously parallel sided now enlarges towards the top and the raw material is now arranged to discharge down a pipe rather than through the side of the kiln.

Experiments were carried out for three months concluding in December, 1929. Reg Duplock, who worked in the kiln, described how pulverised coal was conveyed by means of skips for 150 yards along a tunnel and into the burning chamber.[8] Dr. Martin, writing in 1932, described the results as being "most promising and it is hoped, after making certain alterations, to remedy technical defects which revealed themselves in the trial, to proceed to manufacture clinker by this new process in the near future".[9] It is not known if any further trials were carried out.

It is presumed that the kiln was abandoned for the experimental manufacture of cement after December, 1929 but it seems probable that subsequently attempts were made to burn lime on the site. John de Havilland describes lime burning which took place from 1931 or 1932 and goes on to describe a conventional continuous vertical kiln built against a quarry face.[10] It is possible that the kiln used was the experimental cement kiln built by Dr. Martin after certain modifications were made. On the 1:2500 O.S. Map published in 1955[11] the kiln is described as "Old Lime Kiln" which would seem to confirm this.

The site on the other side of the road, (the Rodmell Works) was developed as a cement works with a rotary kiln by Cement Industries Ltd., building starting in 1932. An important figure A.Y. Gowan, an American who became interested in reorganising the British cement industry at this time had visited Asheham.[12] He set up the Alpha Cement Co. Ltd. in 1933 and bought out Cement Industries Ltd. Alpha is listed in the 1934 *Kelly's Directory of Sussex* under Beddingham as Lime Burners and in the 1934 *Lewes, Newhaven and Seaford Directory* under Rodmell. By this time the success of rotary kilns was established beyond doubt. Any desire on the part of Alpha to continue research into the shaft kiln would have been futile.

DESCRIPTION OF KILN

N.B. For the purposes of descriptions the orientation of the kiln is assumed to be North – South

The kiln at map reference TQ 422091 is built on a spur of the Downs which extended westward into the Ouse valley and has now been substantially excavated as Pit No.3, the top being at the level of 61.7 m above O.D. It comprises a shaft oval in plan 15.3 m x 6.0 m at the top level '5', reducing in size in a series of steps to a rectangle with semi-circular ends, 3.9 x 1.9 m at level '3' (42.2 m above O.D.) The walls of this upper part of the kiln are one-and-a-half bricks (330 mm) thick and are supported on reinforced concrete ring beams spanning between concrete counterfort walls built between the kiln and the surrounding chalk. Access to some of these voids is possible down to some 6 m below level '5'. The top of the kiln is covered generally with four three-ring brick barrel vaults (330 mm thick) of varying spans. The barrel vault at the north end has fallen and an additional 225 mm thickness has been added at a later date to the soffit of the vault at the south end (Figs 7 and 8).

In the crown of the barrel vaults are various apertures. Counting from south to north, in vault No.1 there is an aperture 570 mm diameter with a brick kerb minimum 115 mm high capped with a 32 mm cast iron plate in two parts with centre portion thickened to 50 mm thick and held down with 6 No. 20 mm bolts. Through the centre of this is a 180 mm internal diameter non-ferrous tube with flanged top and with 25 mm steel packing pieces between the underside of the flange and the cast iron cap.

In vault No.2 there is a 320 mm diameter hole with brick kerb covered with a steel plate held down with six 20 mm bolts.

In vault No.3 there is a 20 mm diameter cast iron pipe with flange 140 mm diameter built in to the brickwork.

In vault No.4 there is a 1.0 m diameter aperture covered with a rough concrete slab on permanent galvanised corrugated steel shuttering.

At the south end of the kiln immediately below level '5' there are three chambers with concrete walls, floors and tops and with access to the centre one from the side of the kiln. There appears to be no purpose for

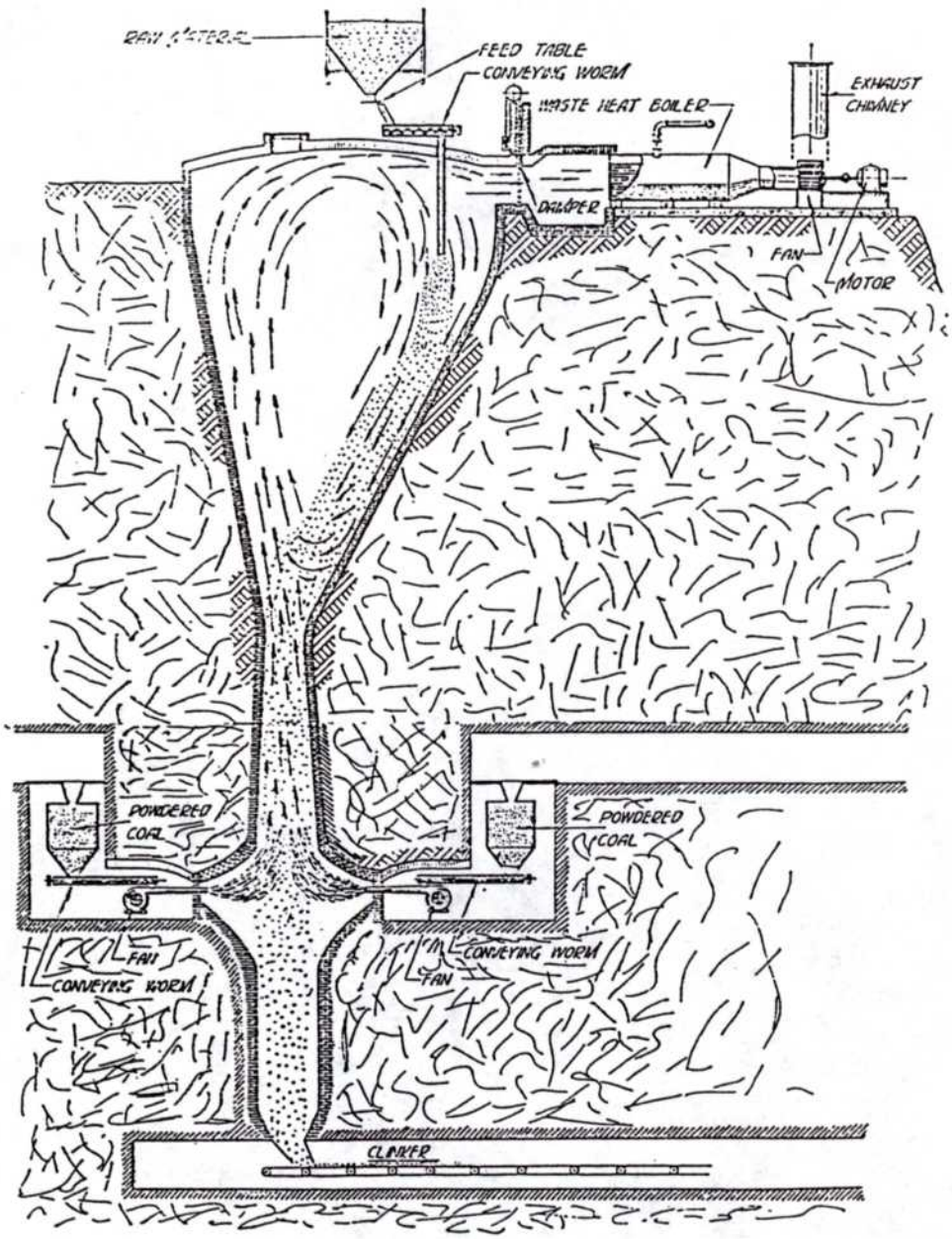


Fig 4. DRAWING OF KILN AT ASHEHAM FROM DR. MARTIN'S BOOK[5]

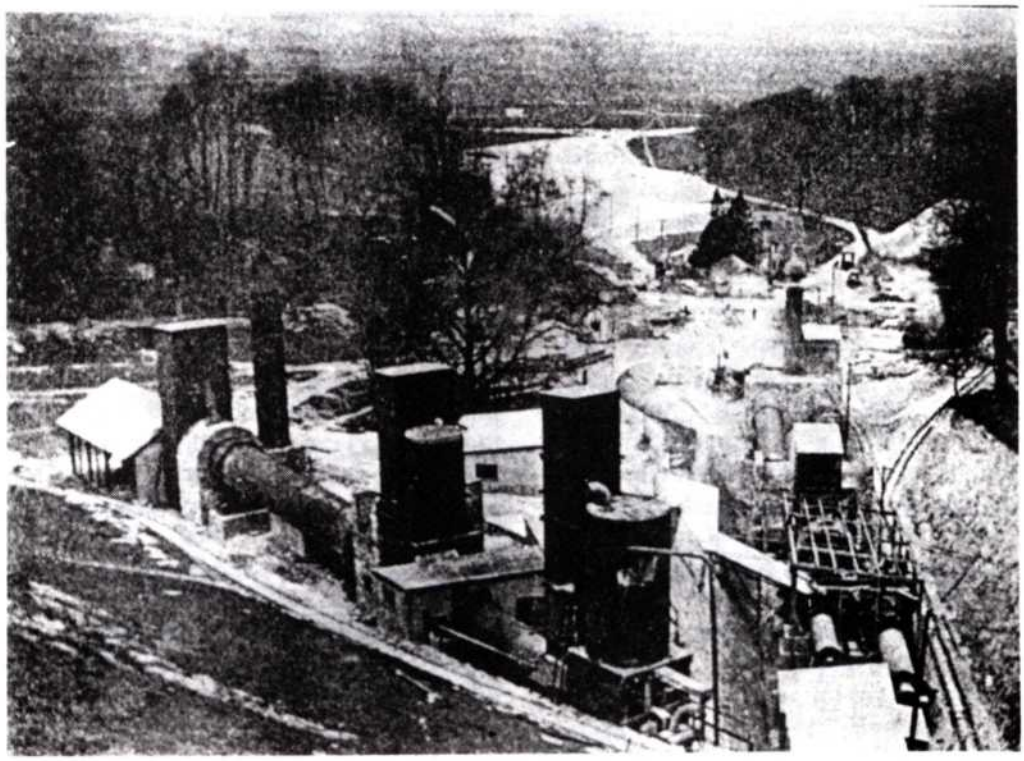


Fig 5. Coal pulverising plant and raw material dryers beside Asham House in 1928.

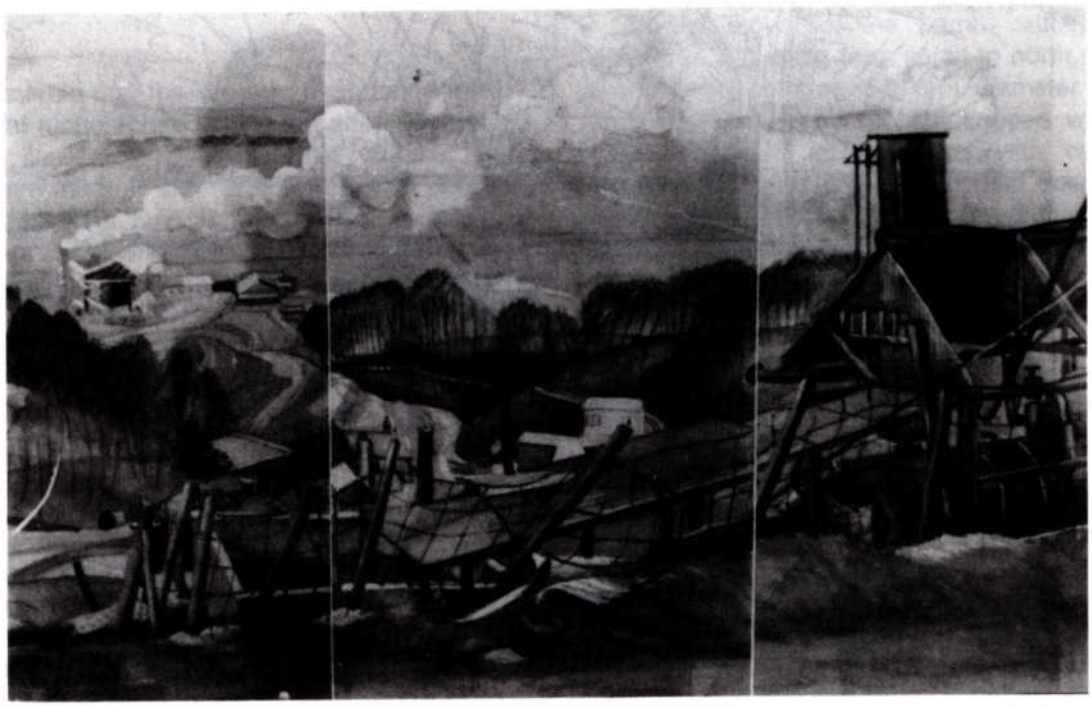


Fig 6. Painting by Peggy Angus of the remains of the top of the kiln in the 1940s.

Fig 7. Outside of the barrel vault over the kiln, looking west. (Ron Martin)

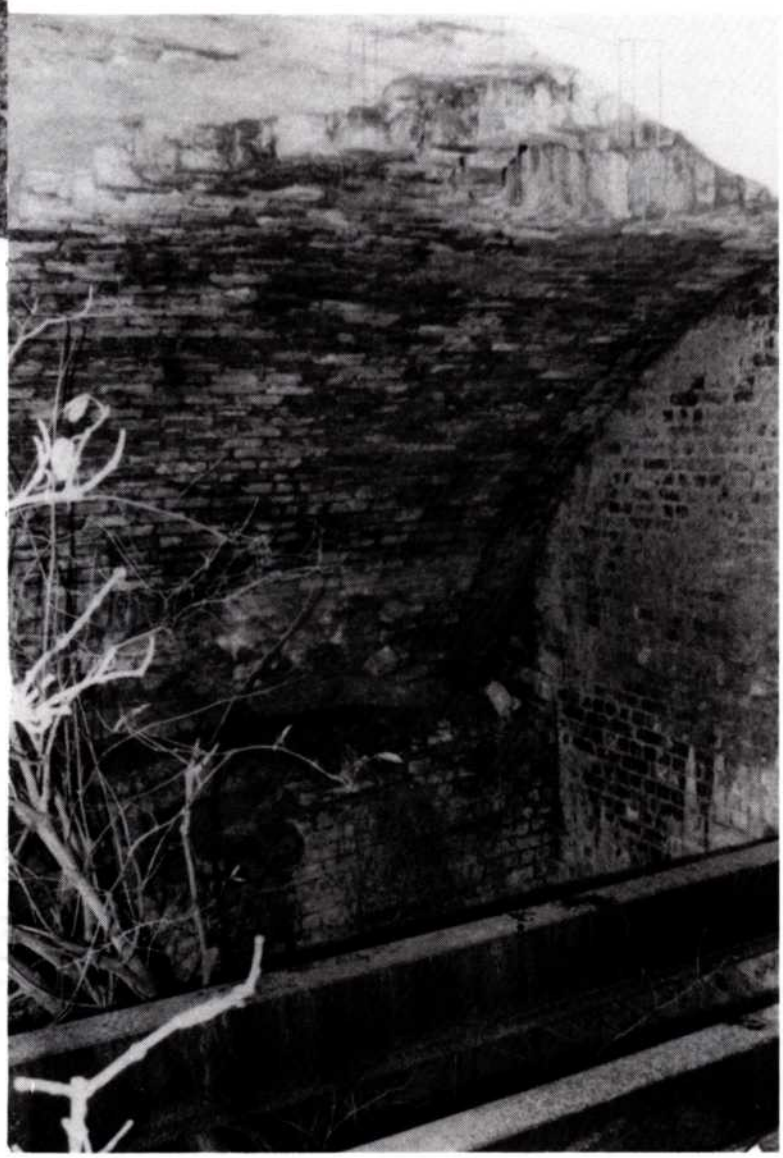
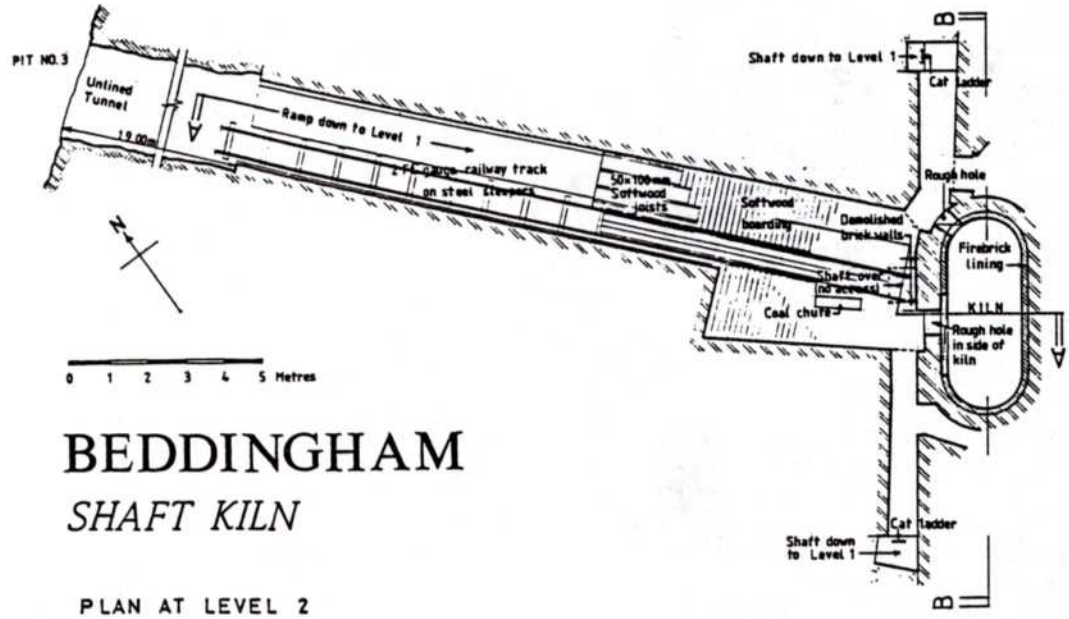


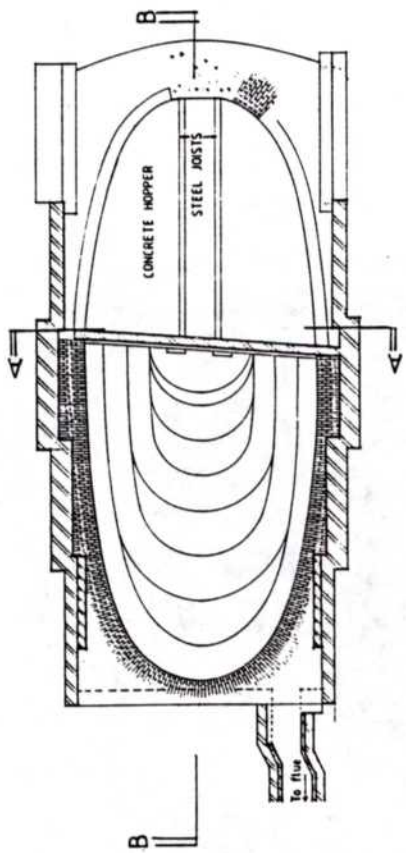
Fig 8. Top of the kiln at the north end (Ron Martin)



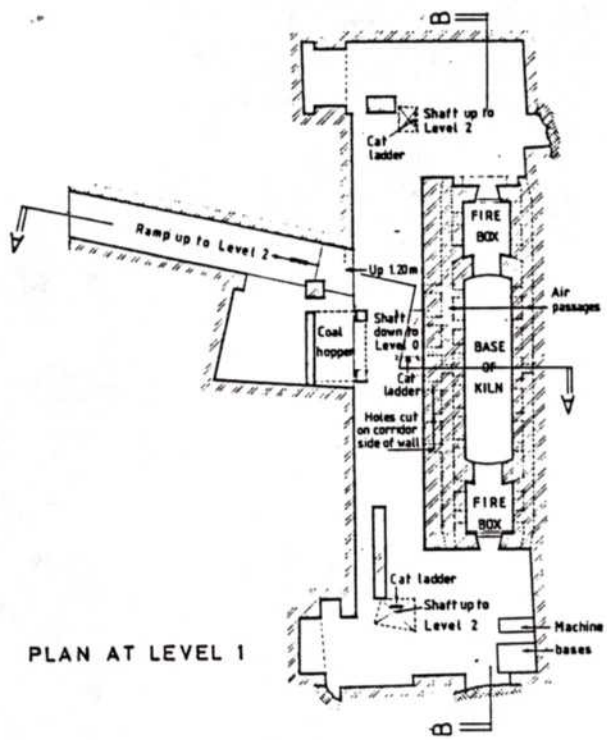
BEDDINGHAM

SHAFT KILN

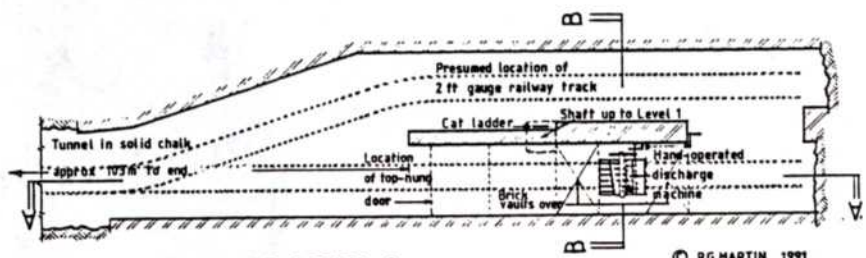
PLAN AT LEVEL 2



PLAN AT LEVEL 5



PLAN AT LEVEL 1



PLAN AT LEVEL 0

Fig 9

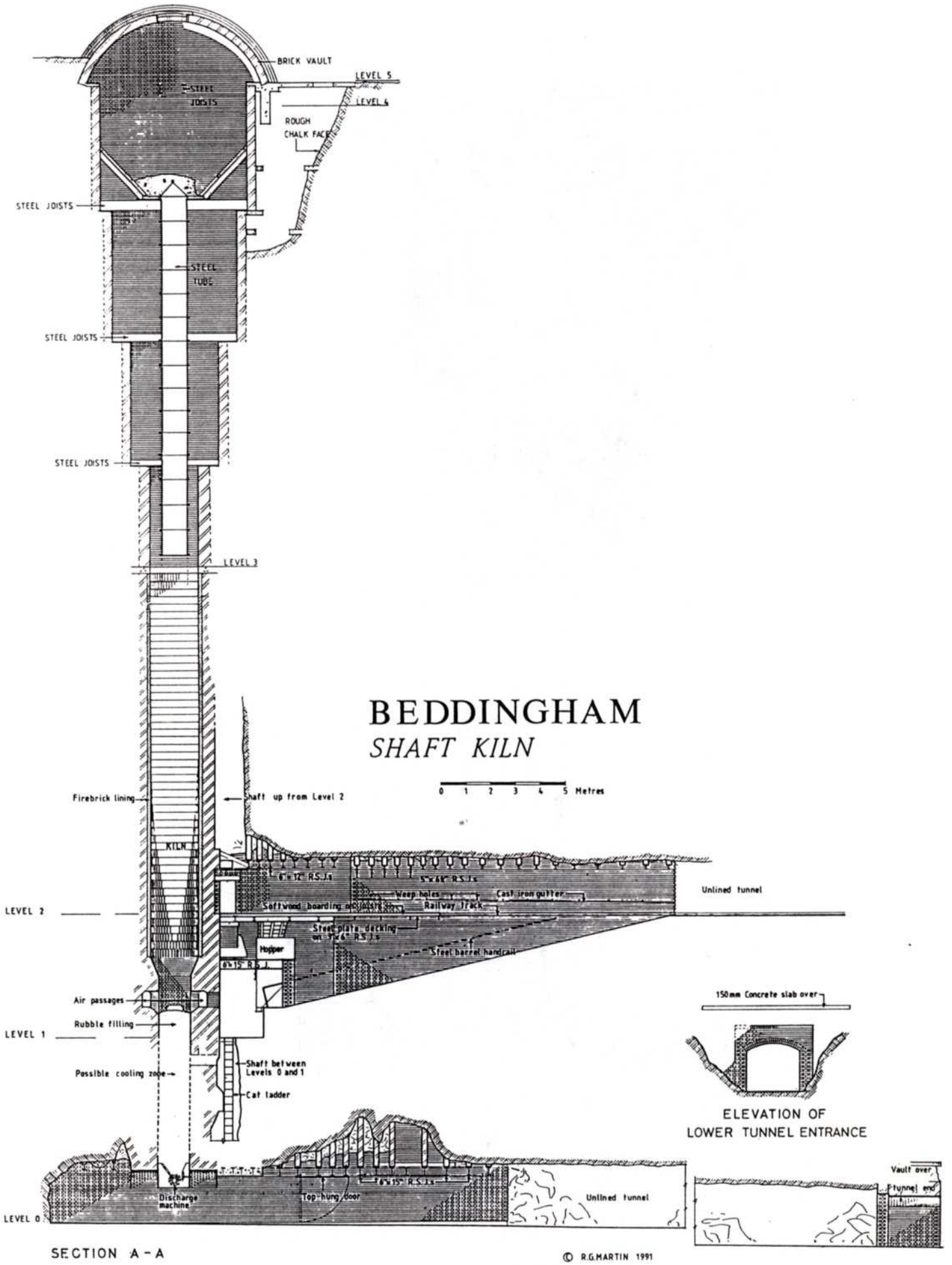

BRICK VAULT
LEVEL 5
STEEL JOISTS
LEVEL 4
ROUGH CHALK FACE
STEEL JOISTS
STEEL TUBE
STEEL JOISTS
STEEL JOISTS
LEVEL 3
BEDDINGHAM
SHAFT KILN
0 1 2 3 4 5 Metres
Firebrick lining
Shaft up from Level 2
KILN
6"x12" R.S.J.s
5"x6½" R.S.J.s
Weep holes
Cast iron gutter
Unlined tunnel
LEVEL 2
Softwood boarding on joists
Railway Track
Steel plate decking on 3"x6" R.S.J.s
Steel barrel handrail
Hopper
6"x15" R.S.J.
Air passages
Rubble filling
LEVEL 1
Possible cooling zone
Shaft between Levels 0 and 1
Cat ladder
150mm Concrete slab over
ELEVATION OF LOWER TUNNEL ENTRANCE
Discharge machine
Top-hung door
6"x15" R.S.J.s
Unlined tunnel
Vault over tunnel end
LEVEL 0
SECTION A-A
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Fig 10

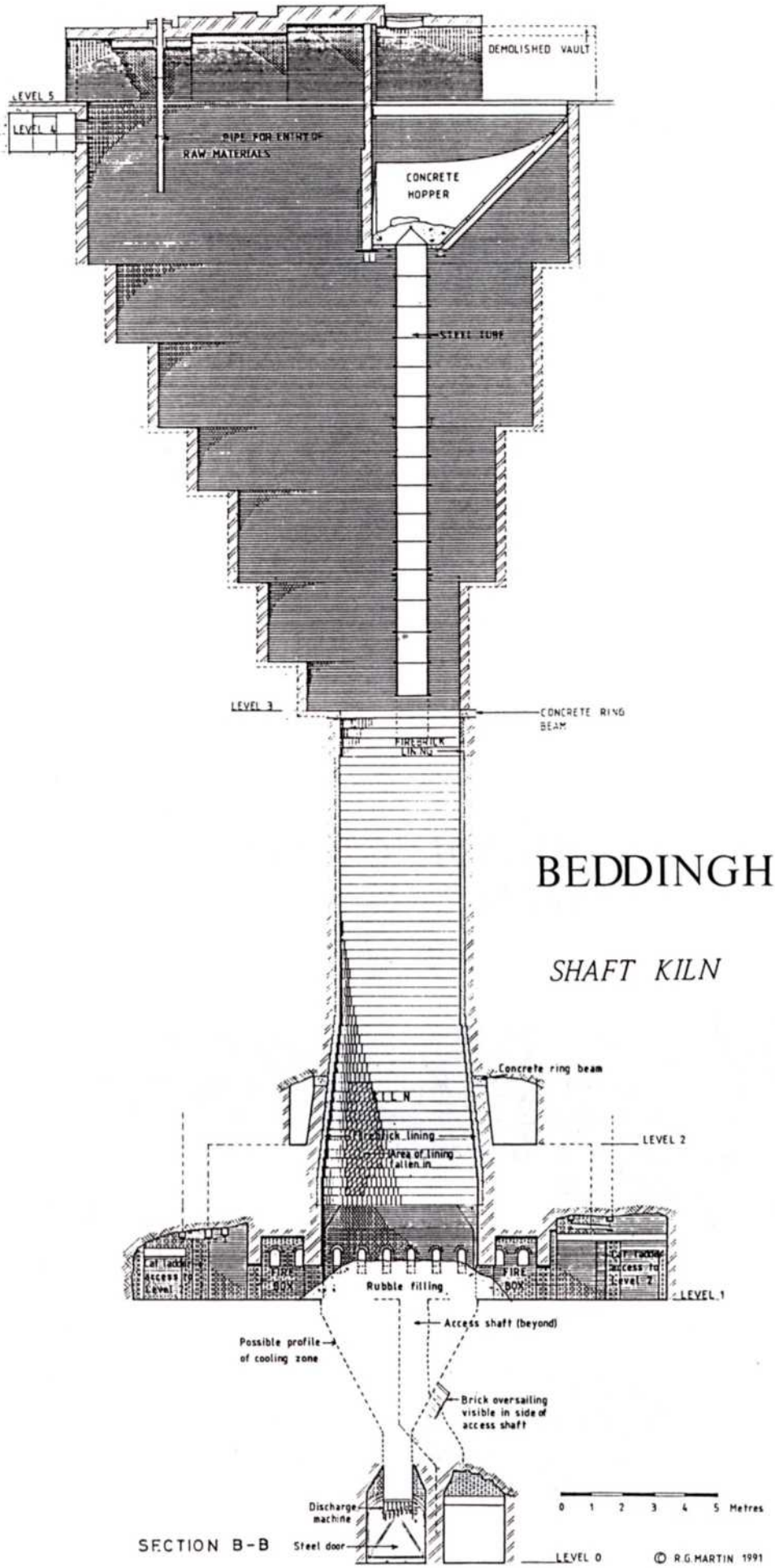
DEMOLISHED VAULT
LEVEL 5
LEVEL 4
PIPE FOR ENTRY OF RAW MATERIALS
CONCRETE HOPPER
STEEL TUBE
LEVEL 3
CONCRETE RING BEAM
FIREBRICK LINING
BEDDINGHAM
SHAFT KILN
Concrete ring beam
KILN
Firebrick lining
Area of lining fallen in
LEVEL 2
FIRE BOX
Rubble filling
FIRE BOX
LEVEL 1
Access shaft (beyond)
Possible profile of cooling zone
Brick oversailing visible in side of access shaft
Discharge machine
Steel door
SECTION B-B
0 1 2 3 4 5 Metres
LEVEL 0
© R.G.MARTIN 1991

Fig 11

Fig 12. Front of the north fire box at level 1 (Nick Catford)

Fig 13. Railway lines at level 2 with ramp leading down to level 1. (Nick Catford)

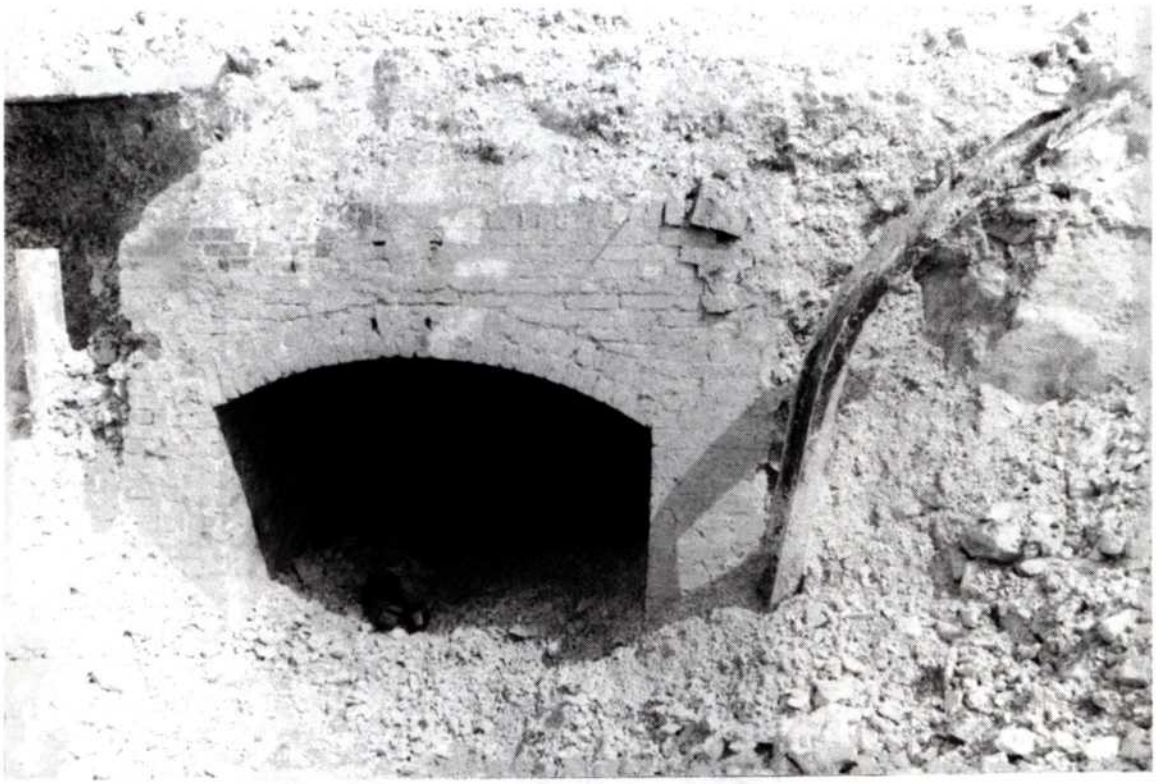

Fig 14. Outside end of the tunnel al level '0'. (Ron Martin)

Fig 15. Tunnel at level '0', looking west (Nick Catford)

these chambers and they may relate to the original construction.

For the next 15.7 m below level '3' the kiln lengthens in the long direction from 3.9 m to 5.1 m with oversailing courses. The kiln walls are 650 mm thick and are lined with 150 x 150 x 300 mm firebricks, laid on end, with special culvert bricks to the curved ends. Below this both long sides are shouldered to reduce the width of the kiln to 1.1 m and the inside of the kiln is lined with brick. This shouldered portion shows considerable signs of striation and erosion. There is no access to the interior of the kiln below level '1' as the bottom is filled with rubble.

At both ends of the kiln at level '1' are fire boxes 1.2 x 1.3 m with 'stoking holes' in two parts with a cast iron z-section beam across the centre of the openings, below which was probably some form of mechanical stoker, as the brickwork was neatly cut around some item of machinery, now missing (Fig 12). There are horizontal ducts 300 mm wide and 500 mm high in the thickness of the walls running along both sides of the kiln and fire boxes, with vaults over and access holes into the kiln (six each side) and into both fire boxes (two each side). There are also openings cut from the horizontal ducts into the service passages and at both ends.

Outside the kiln there are two service levels, level '1' (23.2 m above O.D.) and level '2' (28.2 m above O.D.). These areas are lined with brick walls and the chalk soffit is supported by steel joists with brick pinning walls over. The floor of level '2' consists of sheet steel supported by 75 x 150 mm steel joists and covered by softwood flooring on bearers. From level '2' an unlined tunnel cut in the solid chalk runs westwards along which is laid a 2 foot gauge railway line on steel sleepers. There is an aperture in the floor beside the railway track conected to a timber chute discharging into a steel hopper with two outlets. A ramp leads down from level '2' to 1.2 m above level '1' with a cat ladder below this and there are also two vertical shafts with cat ladders between the two levels (Fig 13). A heap of coke lies in the Southwest corner of level '2'.

At level '1' there are various machine bases with holding down bolts. Located adjacent to the fuel hopper but unfixed is a steel cylinder 1.25 m in diameter with a base 0.45 m high and a conical top 1.40 m high. There is a rectangular outlet at the base presumably previously connected to an air duct.

Below level '1' there is another level '0' (Fig 14,15) at 19.7 m above O.D. with access by a part-vertical part-sloping shaft and cat ladder. This comprises an area 12.0 x 4.3 m tapering at one end to 2.3 m wide with brick walls and a brick dividing wall. The support to the soffit is as the upper levels. At one side of the dividing wall there is a discharging machine which is situated immediately under the centre of the kiln. The lower part of the kiln is blocked with rubble but it is presumed that there is an even taper from level '1' down to 2.0 m above level '0'.

The machine under the kiln consists of a 150 mm diameter shaft on which are a series of cast iron hook-shaped claws, operated via a system of gears by a hand-operated crank. Burnt clinker would be discharged through the bottom of this machine into railway trucks which ran on another 2 foot gauge railway.

One railway line ran straight from the bottom of the kiln down an unlined tunnel which falls at 1 in 96 towards the west, of which there is still about 100 m extant. The line stops at 40 m from the far end at a timber sleeper which has apparently been used as a buffer stop. At the end one of the tipper trucks was buried beneath the end of the blocked tunnel which has now been cleared and the truck removed. There was a branch line which ran down the north side of the dividing wall and a length of curved track is extant but not in position. Located 4.5 m west of the discharge machine was situated a gate constructed of steel sheet on steel angle framing which was top hung from a steel joist and operated by a rope and tackle. There are two cut outs where the gate is closed over the railway tracks. The gate is still extant though not in position.

The upper 7.2 m of the kiln is divided laterally by a brick wall 330 mm thick reducing to 215 mm thick supported on two steel joists, on one side of which is a concrete hopper, from the bottom of which there is a steel tube 0.91 m diameter which extends downwards for at least 14.5 m. The top is bellmouthed and closed with a conical damper connected to a wire rope. Beneath the damper there appears to be another shutter as there is evidence of water being trapped about 2 m below hopper level. It would appear that this wall and hopper was installed after the kiln was constructed as the wall is not parallel to the minor axis of the kiln and is not bonded to the walls of the kiln.

At upper ground level around the kiln there are various structures and machinery bases which are shown on the block plan.

INTERPRETATION

Most of the operation of the kiln to make cement is fairly well documented. In Geoffrey Martins's book

there is a photograph of the "Coal-pulverising Plant and Raw-material Dryers at Asheham".[13] This shows a triangular area which might be at two levels in a small valley with trees in the background. To the left there are two cylindrical silo-like structures each with an adjacent chimney separated by a single storey building and beyond them a cylindrical machine like a small rotary kiln with another small tower beyond. At an angle to these structures is another row consisting of two long tubes with some framework over and buildings at both ends. There are railway tracks visible to both rows of buildings.The area where this plant would have been was subsequently developed for lime production using rotary kilns and it is not possible to distinguish which remains relate to the earliest phase of the work. However, even if the photograph is not of Asheham, it would seem that Dr. Martin implied that the fuel and raw materials were prepared at this level.

The fuel was conveyed into the kiln by means of the tunnel at level '2'. In *Blue Circle Magazine*, Reg Duplock recalls how he "pushed skips of pulverised coal along a tunnel 150 yards long and into the burning chamber".[14] It is presumed that the tunnel had a fall inwards to facilitate this operation but there is insufficient of the line extant to confirm this. The coal came to the site by rail and there was a two-foot gauge railway line with a tunnel under the public road to connect the public railway to the site, initially operated by two second-hand Kerr Stuart locomotives. One of these No.4247 'Dolly' was manufactured in 1922 and was used on the site until the war.[15] A picture by Eric Ravilious painted in 1934[16] shows this locomotive at Asheham.

The raw materials would have had to be conveyed to the top of the kiln. John de Havilland describes how Charles Walls operated a steam winch that hauled narrow gauge wagons up from the quarry to the top of the lime kiln. It is not clear whether he is referring to the kiln which is the subject of this article or another kiln but the principle is feasible. There are remains of 32 mm diameter wire ropes and bases which could be supports for the winch or similar. Due to the topography of the site it would not have been practicable for materials to be transported to the top of the kiln by any other means. The slopes would have been too steep for any vehicles available at the time and furthermore there are no signs of any roadways or tracks at the top.

It is presumed that the hopper "M" was used for the storage of the raw materials after they had been conveyed to the top, with the smaller compartment containing some form of elevator, which might account for the chases in the north wall. The adjacent block of concrete "L" is opposite the hole in the top of vault No.1 and there could have been some form of horizontal conveyor to connect this to the vertical pipe shown on Section A-A. This is also precisely as shown on Dr. Martin's drawing.[17]

For the kiln to operate in the way envisaged by Dr. Martin, the fuel would probably have been injected into the fire boxes by means of some mechanical device. This probably accounts for the shape of the lower part of the holes from the service areas to the fire boxes which are identical at both north and south ends. The interior of the fire boxes and the air passages along the side of the kiln are all affected by heat. The apertures directly from the fire boxes to the kiln are not fire-affected and it is possible the fuel feeding mechanism extended into the kiln. The openings apparently cut from the access areas into the air passages might possibly have been the means of getting the forced draught into the kiln or were cut in order to clear clinker blocking the air passages. The circular aperture over vault No.4 does not appear to have any function apart from access but it is shown on Dr. Martin's drawing.

It is probable that the steel conical drum described on p.33 was the forced draught accelerator although there is no evidence remaining of any ducts. All the access areas are wired for electricity so this would have been available to power the fuel feed and forced draught apparatus.

The clinker after it had descended to the base of the cooling zone would be removed through a discharging machine described above.

It is considered possible that there would have been some means of providing a hot bed to commence the process of firing. Although the shape of the cooling zone has not been determined there is a blocked arched aperture visible in the side about 2 m below level '1' and some evidence of a level floor.

The hot gases being drawn from the top of the kiln, according to Dr. Martin[18] would pass through a waste heat boiler, controlled by a damper, then through a fan and on to an exhaust chimney. The cast iron plate is probably the damper "E" operated by a shaft and pulleys. Also shown on Dr. Martin's drawing is a chamber just beyond the damper with a sunken floor which could be feature "C". Other bases in this area "D" could be the bases for the waste heat boiler fan and motor. The flue "A" runs up the slope and from the end of this complex of machinery.

Many of these features are shown on a painting of the late 1930s by Peggy Angus showing the derelict

top of the kiln (Fig 6). There is a gabled roof over what was probably the waste heat boiler with a sloping corrugated steel roof over the machines to the south. Also identifiable is the shaft and pulleys, the tank, "F" and the bases which show a short stump with wire rope lashed on. There is a circular silo to the west of the kiln which may have been mounted over the top of the concrete base "B". Two substantial posts at the west side of the tank could have been something to do with the hoisting apparatus.

There are various other structures to which no function can be attributed. The reservoir "O" may be of a much later date to provide water to the later lime and cement manufacturing plants.

It is certain that alterations have been made to the kiln and these probably relate to the attempts in 1931-32 to use it as a continuous mixed feed lime kiln. The hopper at level '5' with the brick dividing wall and the 0.91 m diameter steel tube are probably of this phase. There is evidence of chalk and coke present in the hopper and the conical damper would be the normal way of controlling discharge from a hopper into a kiln as shown by A.B. Searle.[19] The fact that it then passed down 14.5 m of tube merely indicates that only the bottom part of the kiln was actually being used. It is also possible that the flue, or at least the horizontal part of the flue, is associated with this as there is an offset at the junction with the end of the kiln and some of the brickwork there is not properly bonded in.

The pit where chalk has been dug "P" was probably used for lime production as the mixed raw materials for the cement making operation were apparently prepared at the bottom plant according to Dr. Martin's account.

There is evidence of an explosion in the side of the kiln at level '2', about 4 m^2 of the inner lining having fallen in and a smaller hole in the brick backing wall. There is an uncorroborated report of the death of three workers at the kiln and the subsequent suicide of the designer of the kiln.

CONCLUSION

This kiln probably represents the only example of this type in existence and was an interesting experiment which if it had proved successful might have seen the adoptions of shaft kilns instead of rotary kilns for the production of cement. A post-World War II development for calcining very small limestone is a "Fluo-Solids" kiln[20] which has some similar characteristics to Dr. Martin's Flotation Kiln and this suggests that perhaps he was years ahead of his time.

Due to its location in relation to the landfill site there is no way that the kiln can be preserved. I have however been given every opportunity and assistance from Blue Circle Industries, Plc. to enable a full record to be made before its ultimate destruction. When this happens further evidence may come to light as to its construction.

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REFERENCES

1. HMSO., *104th Annual Report on Alkali &c. Works* by the Chief Inspectors (1967) 44.
2. Sir Percy Girouard, *British Patent No. 260.608*; (application date 7 Aug 1925; complete acceptance 8 Nov 1926).
3. *The Times* 27 Sept 1932, obituary column
4. Geoffrey Martin, *British Patent No. 276.066* (application date 17 May 1926; complete acceptance date 17 Aug 1927).
5. Geoffrey Martin, *Chemical Engineering and Thermodynamics Applied to the Cement Rotary Kilns, etc.* (1932) 28.16-20
6. John de Havilland, "Rodmell Cement Works – a History", *Great Bush Telegraph* 5.
7. Martin, *Chemical Engineering* 28.17
8. *Blue Circle* vol 27 no 1 (1972)
9. Martin, *Chemical Engineering* 28.21
10. de Havilland, *op cit* 7
11. 1:2500 OS map sheet TQ 40 NE (1955)
12. P. Lesley Cook, *Effects of Mergers* (1958) 92-3
13. Martin, *Chemical Engineering* 28.18
14. Blue Circle *op cit.*
15. de Havilland *op cit* 18
16. Eric Ravilious, "Dolly Engine" 1934, Towner Art Gallery and Local History Museum, Eastbourne.
17. Martin, *Chemical Engineering* 28.17
18. *Ibid.* 28.6-20
19. A.B. Searle, *Limestone and its products: their nature, production and uses* (1935) 345.
20. Robert S. Boynton, *Chemistry and Technology of Lime and Limestones* (2nd edn 1980) 270-1

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