SUSSEX INDUSTRIAL HISTORY

No. 11

1981

COBB'S MILL
HASTINGS TROLLEYBUS SYSTEM
ASHBURNHAM BRICKWORKS
THOMAS DURRANT, MILLER
WORTHING ELECTRICITY SUPPLY

PRICE £1.00

SUSSEX INDUSTRIAL ARCHAEOLOGY SOCIETY

Founded, as the Sussex Industrial Archaeology Study Group in 1967

Cover Picture
Cobb's Mill

The Annual Subscription to the Society is £3.00, payable on 1st April. Life Membership is available for a single payment of 15 times the current annual subscription. Annual and Life Membership includes the annual issue of 'Sussex Industrial History' and the quarterly 'Newsletter'.

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SUSSEX INDUSTRIAL HISTORY

Journal of the Sussex Industrial Archaeology Society

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EDITORIAL

Although the title of this Journal refers to Industrial History it also relates to Industrial Archaeology and is indeed published by the Sussex Industrial Archaeology Society. Research into industrial history involves study of early patent specifications, account books, annual reports and other documents but to be fully effective it must be backed up by the field work of industrial archaeologists who study, preserve and restore the artefacts, machinery and constructional works whereby the early engineers converted scientific ideas into sound technical practice.

Most of the field work is carried out by voluntary effort and provides a fascinating hobby and one which can be effectively carried out, under suitable supervision, by young people. In this way the younger generation can learn much by observing and studying the steps by which engineers of the past advanced the state of technical knowledge to its present almost overwhelming degree of achievement.

The Sussex Industrial Archaeology Society endeavours to stress this aspect of its work by organising small working groups from schools, Scouts and other similar organisations to undertake limited projects, by giving talks to such bodies and, from time to time offering a Prize for an Essay on a subject relevant to industrial history or archaeology. The Society would be very pleased to hear, through one of its Officers or Committee Members, of any reader who might be able to help or make suggestions regarding this important aspect of the Society's work.

Published by the Sussex Industrial Archaeology Society.

COBB'S MILL

By J. S. F. Blackwell, W. R. Beswick, M. Brunnarius, F. W. Gregory, R. M. Palmer and P. F. Spells.

Cobb's Mill at Sayers Green near Hurstpierpoint (TQ 295190) is an excellent example of Victorian millwrighting, the four pairs of stones being driven initially by either water or steam power. The steam plant was later replaced by a gas engine with its own gas producer plant. As the mill only stopped working 15 years ago the plant was in fairly good condition and in July 1979 a working weekend was held by Sussex Industrial Archaeology Society members in order to arrest further deterioration and to survey and record the structure and plant.

The working weekend was most successful; the cog pit was cleaned and greased, the gas engine cleaned and wire brushed and the bright parts coated with a film of protective oil, the gas producer de-rusted and painted, the mill race cleared and brickwork and weather boarding repainted and replaced. It is hoped in the future with the continuing cooperation of the enthusiastic owners of the mill, Mr. and Mrs. J. D. F. Jackson, that it can be restored to working order.

J.S.F.B.

History

The mill and associated outbuildings stand ¼mile N.E. of Sayers Common close to the junction of Mill Lane, Pookbourne Lane and Langton Lane. This was undoubtably a focal point of local country industry during the days of watermilling. Although close to the village the site is in the parish of Hurstpierpoint and positioned to take water from Danworth Brook which is a headwater of the Adur.

This stream springs in Clayton Parish and was in turn a source of power for Hammonds Mill (1) there and Ruckford Mill (2) in Hurstpierpoint, 1½ and 2 miles respectively upstream of Cobb's Mill. Approximately ½ mile upstream is a natural meeting of Danworth Brook with the smaller Langton Brook. From this point a wide embanked leat was navigated through open fields, parallel with the smaller brook and opened out at the mill end to form a header pond giving a fall of water of approximately 15ft between the streams at the mill.

The Domesday survey (3) recorded that 'Robert-de-Pierpoint' held the land of William-de-Warren, known as the manor of 'Herst' which contained three mills, but as is often the case, no indication is given as to the type or exact location. Richard Budgen's map of 1724 (4) shows this as CABS mill. The name was retained on subsequent maps and still known as CABBS (5) in 1823.

Something of the occupancy of the site can be gleaned by studying the extant buildings. These consist of a main block of three portions associated with the matermill and various outbuildings which formed a smallholding. Between the present watermill and the mill house, both of which were undoubtably part of a successful Victorian milling business, is the greater part of an earlier mill house understood to date from the 17th century (6). It appears that an earlier mill was incorporated into the back and end of this house. Here, at the time of Budgen's survey, was a somewhat smaller combined mill and mill house plus adjacent farm buildings, possibly standing on the site of one of the Domesday mills.

From the construction and appearance of the present watermill (see cover drawing) it would seem that the whole complex was thoroughly re-worked in the mid 19th century, the watermill being completely rebuilt, and the Victorian wing of the mill house added at the northern end.

At the turn of the 19th century Cobb's Mill was owned by Anthony Ede of Shermanbury (7). This then passed to Thomas Ede who put the lease up for sale in 1834. Mr. James Mitchell was working the mill at that time and went to work Duncton Post Mill at Clayton shortly after (8). Mr. Henry Pickett of Hurstpierpoint became the owner and let the mill to Mr. Charles Packham in whose name the business was continued for 130 years. In 1865 the property was for sale once more as shown in the following notice:-

Sussex Advertiser, November 7th 1865; (9)

"Mr. Drawbridge will sell by auction at the New Inn, Hurstpierpoint, on 24th Nov. 1865 by order of the trustees of the Late Mr. Edward Pickett;... Lot 4 A brick and timber built water corn mill known by the name of Cobb's mill driving three pairs of stones, standing upon a stream with a fine supply of water and close to the highroad with residence and farm buildings, and large gardens. It is now in the occupation of Mr. Charles Packham. ...."

The sons Charles and Benjamin Packham had been working the mill since 1850 (9) and it seems that Charles took over as CHARLES PACKHAM, then in 1870 as CHARLES PACKHAM & SON (10). During this period the mill was completely rebuilt in such a way as to enable either engine or water power to be used conveniently.

Originally steam plant would have been employed but by 1925 the business was quoted as CHARLES PACKHAM LTD. (OIL) (10) indicating that a more reliable engine had been fitted. In 1966 (11), when Cobb's Mill finally stopped, a producer gas engine was still in use (described below).

William Cooper (1)(2), who worked on many mills in the area out of his yard at Nep Town in Henfield, was almost certainly responsible for the mill-wrighting during the rebuild. His plate is still to be seen on the pen-trough at Cobb's Mill -

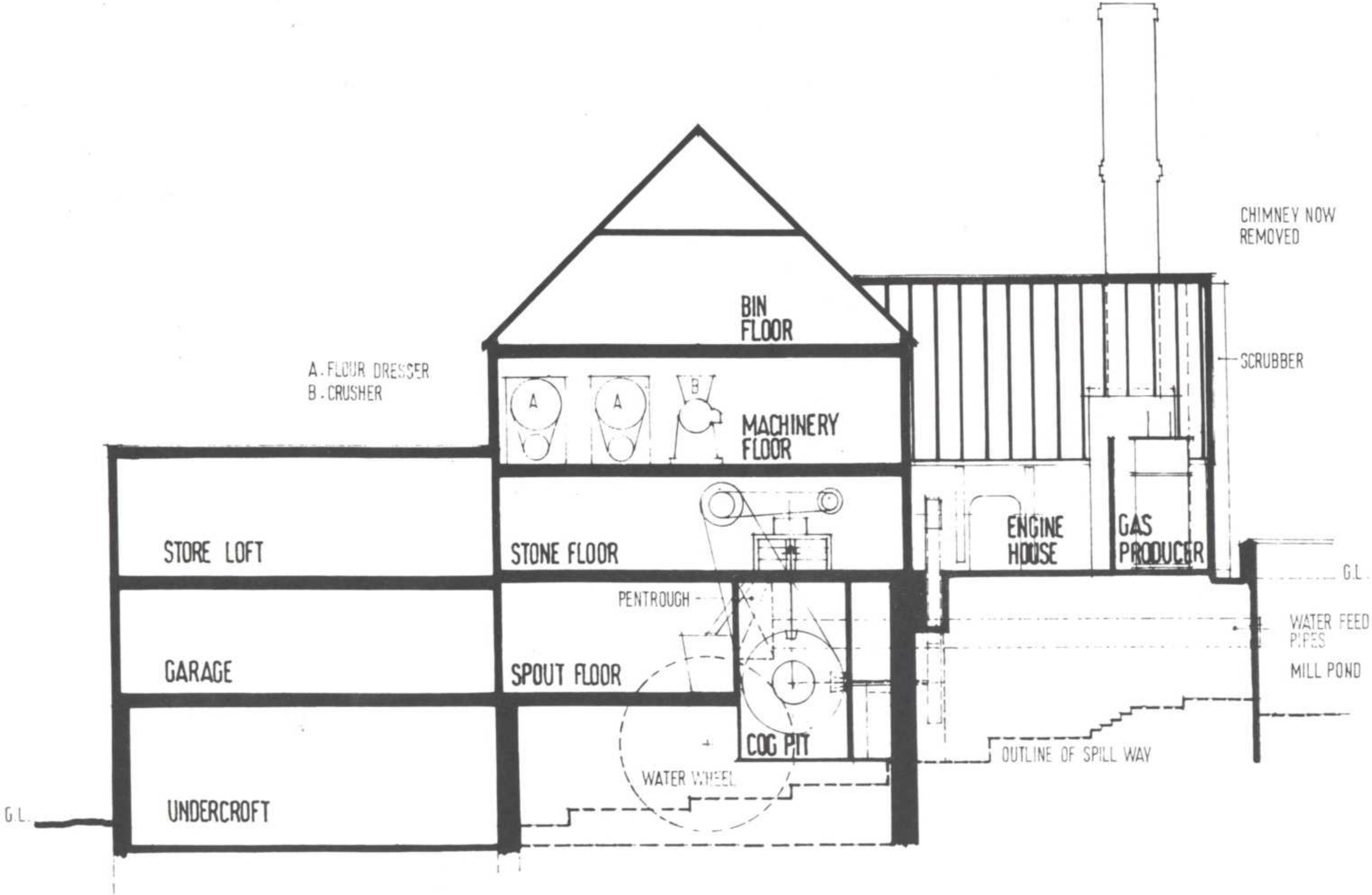
W. COOPER
MILLWRIGHT & ENGINEER
HENFIELD
1868

In its last few years the millers were Fred Sayers and Percy Trower and it was a pleasure to watch these two men at work. When Fred Sayers retired Percy Trower continued to operate the mill until it ceased operation on 6th January, 1966 (11). Up to the end of the war flour was made and there still remain two scalpers (flour dressers) by Smith of Carshalton. In its last years of work the mill ground for animal feed.

There remains in the mill a most uncommon stone-dressing machine invented and patented in 1870 by James Lee Norton and is described in the patent as a machine for dressing and furrowing mill stones using a diamond as a cutter. Although fairly common in U.S.A. this is thought to be one of only two remaining in this country.

Construction

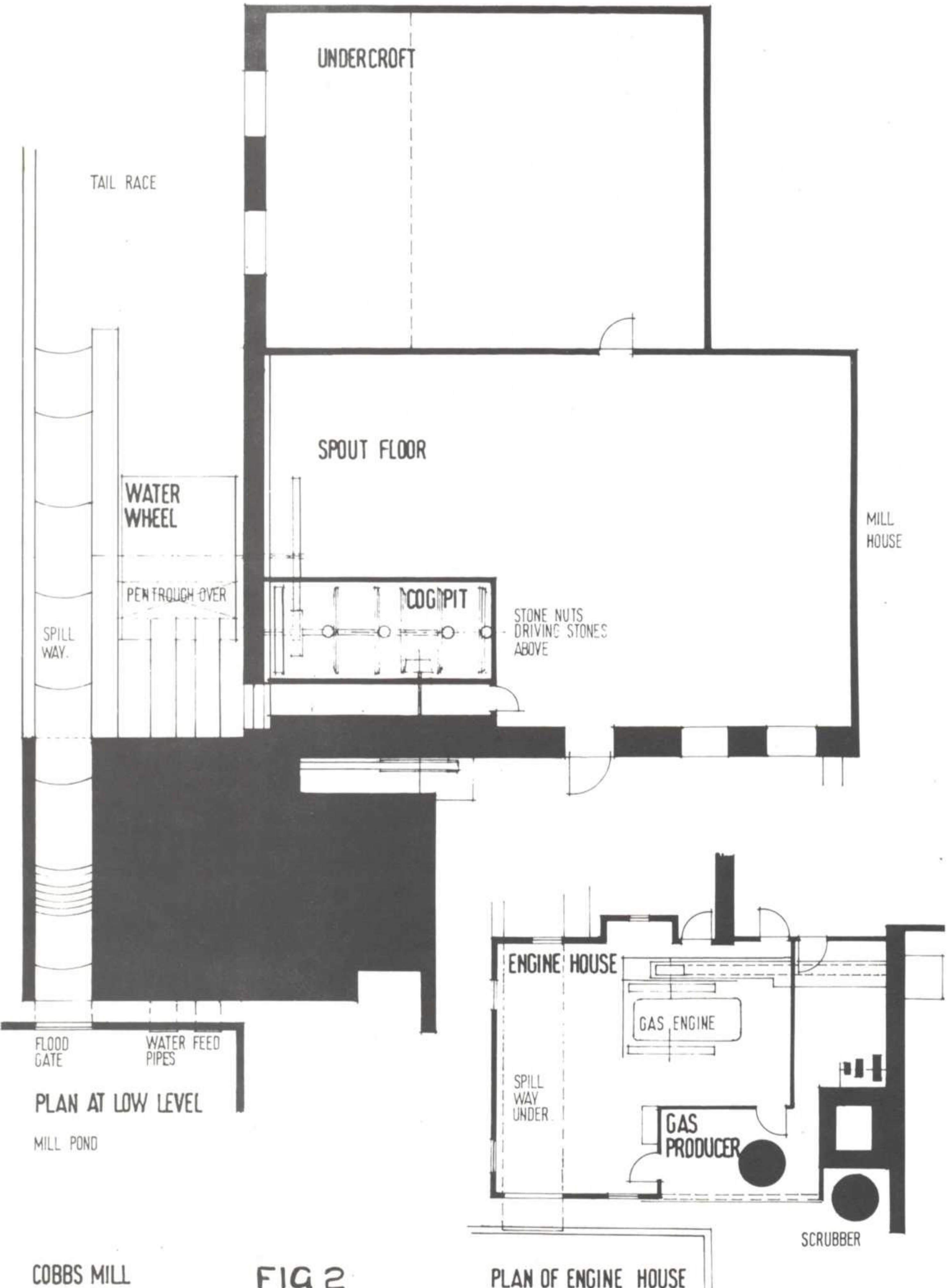
Cooper was a forward-looking willwright and abandoned the traditional layout, i.e. the positioning of the stones around a large horizontal spur wheel mounted on a permanently-engaged vertical shaft. He introduced a 5-inch



CROSS SECTION

FIG 1

COBBS MILL



COBBS MILL

FIG 2

PLAN OF ENGINE HOUSE

diameter horizontal pit shaft carrying, initially, three 6 ft. diameter bevel wheels faced with wooden cogs to drive, through cast-iron stone nuts, each of three pairs of stones arranged in line on the stone floor. A fourth pair of stones was added later (see Figs 1 and 2), a 5 ft. length of shaft carrying another bevel wheel being coupled to the end of the existing pit shaft and mounted on separate bearings.

At the driving end of the pit shaft a 3 ft. diameter sliding spur pinion could be brought into mesh with an 11 ft. diameter spur wheel mounted, just inside the mill wall, on the shaft of the 11 ft.diameter overshot water wheel, this being a replacement installed after the end of the 1939-45 war.

In case of drought or interference in water flow caused by a mill upstream the auxiliary steam engine, later replaced by a gas engine (described later) was installed; such difficulties were accentuated when the Burgess Hill Water Co. abstracted water from the Downs before it ever reached the stream. The engine was permanently connected by belt and pulley to a horizontal shaft carrying a large sliding bevel nut; this nut, after disengagement of the water wheel, could be slid into mesh with a bevel wheel mounted on the pit shaft between the wheels for the second and third pairs of stones, thus enabling engine power to be applied. Two centrifugal governors were also included.

A belt pulley on the pit shaft gave a drive for the auxiliary machinery - rack hoist (now electric) and flour dressing machinery.

Cobb's Mill is the second of two Sussex watermills with a horizontal pit-shaft drive by Cooper, the other being the Town Mill at Horsham. In this mill an overshot wheel at the south end normally drove three pairs of stones but in flood periods, when the overshot wheel was drowned, a breastshot wheel at the north end, and at a higher level, could be put into operation. The cast-iron pillars of the mill are dated 1867 but, except for the overshot wheel, all the machinery has been destroyed.

M.B., F.W.G.

The Gas Engine and Gas Producer

The National gas producer and Tangye engine were installed in 1906 to power the mill at times of water shortage.

Tangye of Birmingham were well known builders of industrial engines, first of steam and later of gas engines but they ceased engine manufacture in the 1930's although they are still in business making hydraulic equipment.

The gas engine at Cobb's Mill, Serial No. 12330, is a single cylinder, open crank, horizontal 4-stroke engine of a design generally followed by most makers between about 1890 and 1930. There are two flywheels, of 6 ft. and 5 ft. 6 in. diameter; the crankshaft is coupled through a friction clutch to a belt pulley, from which power is delivered to the mill shafting. Cylinder bore is 13 in. and stroke 21 in. Ignition is by low-tension oscillating magneto connected to a make-and-break plug within the cylinder. Events are timed so that when the magneto generates a voltage the plug points are closed and a current flows; the plug points are then opened mechanically and the current continues to flow, producing a spark. Governing is effected by a hit-and-miss linkage between the gas valve and its cam, such that when engine speed rises above the governed setting the gas valve fails to open and the engine misses a power stroke.

It is estimated that the engine would have run at about 170 revolutions per minute and would be capable of developing 40 horsepower. It would therefore have easily been capable of driving the four sets of stones plus other ancillary machinery. The engine appears to be complete and in good order.

R.M.P.

The simple form of suction gas producer was installed to feed the adjoining gas engine with fuel gas. It is a two vessel plant comprising the generator and a wet scrubber and was designed to operate on a non-bituminous fuel such as coke or anthracite. (Fig.3)

The generator is of 20 inches effective internal diameter with a refractory brick lining to the mild steel lower portion. The upper part is made in cast-iron and the top plate supports a fuel hopper and feed bell. A cast-iron skirt extends down into the generator to assist fuel distribution and this helps to maintain an even pressure loss across the fuel bed. Four poke holes are placed around the top plate and there is another in the fuel feed. The flat cast-iron grate is in two parts one superimposed upon the other and below grate level is a ring main which gives a water drip feed for blast saturation. Ash is removed through two cast-iron inspection doors mounted in the generator base. Air blast is drawn into the grate area by the suction across the plant.

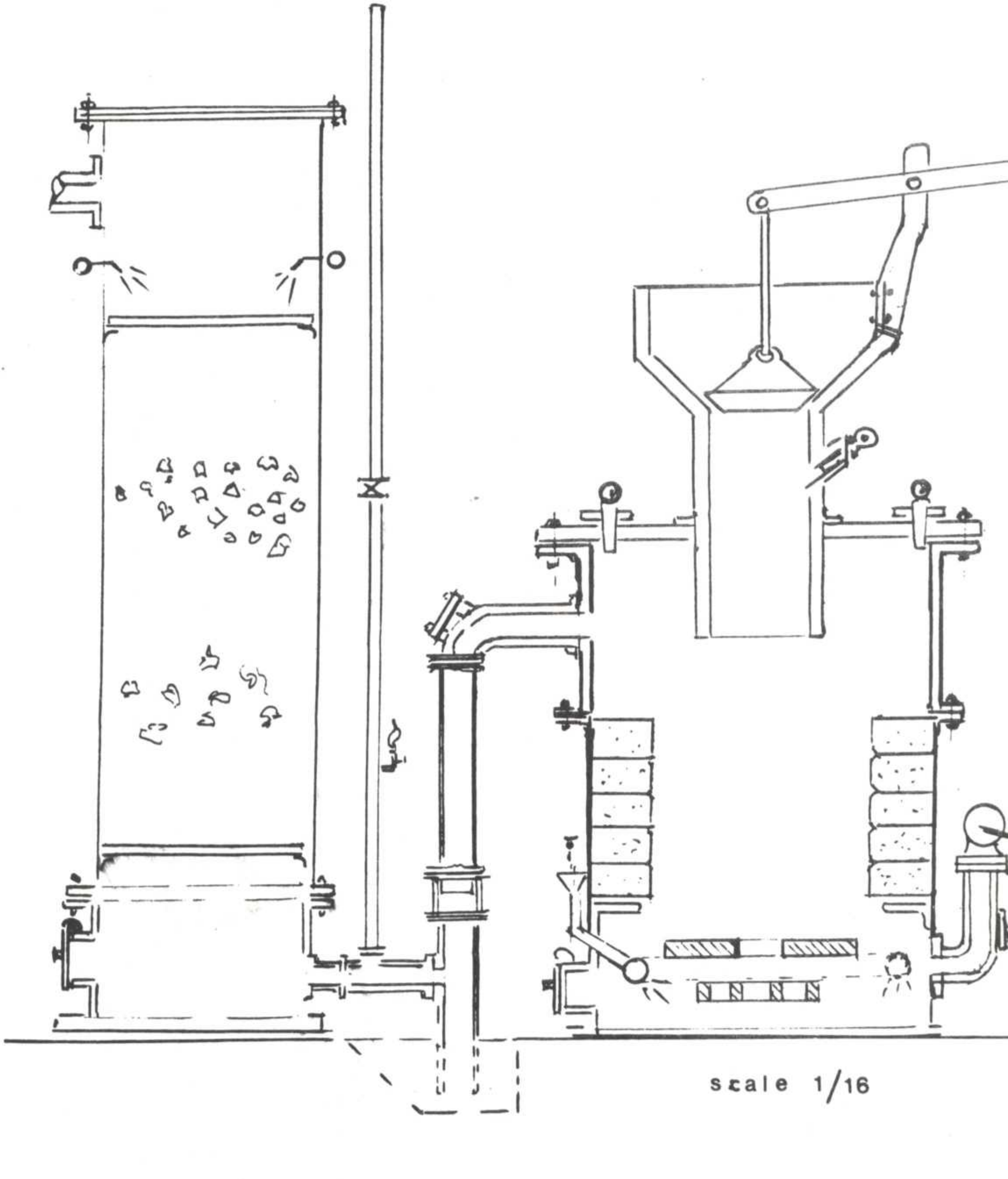
The wet scrubber has a mild-steel shell supported on a cast-iron base, it is 7 ft.4 in. high and 2 ft.6 in. in diameter and is filled with coke contact material down which water flows from a ring main and sprays set at the top. The base has an inspection door and a drain for effluent wash water.

The plant is designed to operate on suction from the engine and when operating, hot gas from the top of the generator is led down to the base of the scrubber by a cast-iron main which has an open branch dipping into a concrete safety lute filled with water. After passing upwards through the wet scrubber the gas is reasonably cool and clean and is led from the top of the scrubber to the adjoining gas engine.

For starting-up purpose and to avoid back-draft on standby, there is a blow-off valve and pipe into which is fitted a test cock to indicate ignitable gas. Also when starting-up, it is necessary to blow the fuel bed by hand until ignitable gas can be sent through to the engine. For this, a geared hand blower is mounted on the side of the generator.

The process of making producer gas is one of the partial combustion of carbonaceous fuel. Air saturated with water vapour or steam passes through a bed of incandescent fuel and decomposes into products of combustion (carbon dioxide and nitrogen) and the ignitable gases carbon monoxide, hydrogen and a small amount of volatiles. Using anthracite, such a gas would have a calorific value of about 135 British thermal units (B.Th.U.) when made in a plant of this type and a pound of fuel would give about 70 cubic feet of such gas. It follows that assuming 14,500 B.Th.U.s in one pound of fuel and 70 x 135 = 9450 B.Th.U.s in the gas therefrom. The conversion from heat in fuel to heat in gas has been 65 per cent, and further that one horse power in the gas engine will need rather more than one pound of fuel per hour. This particular plant at full load would provide gas for about 25 I.H.P. depending on the quality of the fuel and the care in operational control.

W.R.B.



COBBS MILL

"NATIONAL" GAS PRODUCER no: 5549

FIG 3

WRB

References

Acknowledgement is made by M.B. to the Late H. E. S. Simmons' work; Sussex Watermills, his notes on Cobb's Mill in particular.

1. Demolished in the summer of 1975. Some machinery fitted by Cooper in 1871. The pentrough is now at Ifield Mill.
2. Now cleared of machinery and used as accommodation by Hurstpierpoint College. This had two water wheels by Cooper dated 1861 and 1870.
3. Circa 1086.
4. 1" Map of Sussex.
5. This may be a corruption of COBS or COBBS introduced by the surveyor who did not allow for Sussex dialect.
6. Part of the back wall of this portion is built of stone which is perhaps evidence of the inclusion of an even older building.
7. Defence schedules of 1801. E.S.R.O.
8. Shown at Clayton in 1838. W.S.R.O. TD/E 72
9. Simmons Collection; Sussex Windmills.
10. Kelly's Directories.
11. Mr. F. W. Gregory who was familiar with this mill and its latterday millers was present on the day that work finally stopped here in 1966.

THE HASTINGS TROLLEYBUS SYSTEM, 1928 - 1959

Including the History of the preserved Trolleybus No. DY 4965

By K. S. Donaldson.

In July 1927 the Hastings Tramways Company obtained the Hastings Tramways Company (Trolley Vehicles) Act 1927, which authorised the replacement of 65 fourwheeled tramcars by trolleybuses, and began impletmenting its plan to open the first system of trackless trolley omnibuses in Sussex. In addition to the engineering and organisational difficulties that had to be overcome there was the opposition of the Hastings Corporation, and the proceedings at the Annual Meeting of the Hastings & District Electric Tramways Co., Ltd., held at 1 Queen Victoria Street, London EC4 on Tuesday, 15th May, 1928, record a particularly vitriolic attack by the Chairman (who was also Managing Director of the Company), Mr. Gerald P. Moody, on the Corporation for fighting the Bill in the House of Lords.

The Corporation wanted motor buses because these did not require traction poles and overhead wiring to be strung along the extensive sea-front whereas the Company with substantial investment in generating equipment and wiring for trams wanted to stay with electric traction. The Act having passed however, the Company went ahead with the conversion of the tramways system to a trolleybus system which opened on 1st April, 1928, when trolleybuses replaced trams on the route between Hollington and the Fishmarket via Bohemia Road. The vehicles operated were Guy BTX 60, six-wheeled trolleybuses with Dodson open-top double-deck bodies with open staircases at the rear. There was seating for 26 passengers upstairs and 31 downstairs. These vehicles were the first of their kind in the country and indeed for many years were the only open-topped double-decker trolleybuses operating anywhere.

They must have made a deep impression on their crews because the writer remembers riding as a small boy on the modern fleet in the 1950's and being very puzzled at references by conductors to "on top" and "inside" - open-topped buses having been out of service for some fifteen years at the time.

Conversion to trolleybuses took place very quickly and by the end of 1929 the whole fleet of 65 four-wheeled tram cars were out of service. The trolleybus system, although basically operating the same routes used by the tramways involved some slight additions, particularly in the Old Town where trams had never penetrated. (Fig. 4). The service through to Bexhill which had always been part of the Hastings Tramways undertaking was converted in September 1928 with the completion of the overhead wiring from West Marina to Cooden.

By 1931 the Company was operating the 8 double-decked vehicles and had 50 single-decked vehicles with Ransome bodies all built on Guy BTX chassis. Total route mileage was just over 22 miles making the undertaking one of the largest of its kind in the world. At that time it was such a show-piece that the Twentieth Annual Congress of the Tramways Light Railways and Transport Association was held in Hastings in June 1930 and one of the papers presented to the Congress was entitled "Notes on Substituting a Trolleybus System for a Tramway" by Mr. Vincent Edwards, AMIEE, General Manager and Engineer, Hastings Tramways Company.

Some of his observations note that the trolleybuses were smooth and quick running, accelerated without jerking passengers, did not create fumes or odours and carried passengers in complete safety owing to the air and electric brakes with which they were fitted. He also points out that the trolleybuses were driven by power derived from British coal whereas all petrol was produced abroad so that by riding on a trolleybus one not only helped the distressed miners but supported a British Industry.

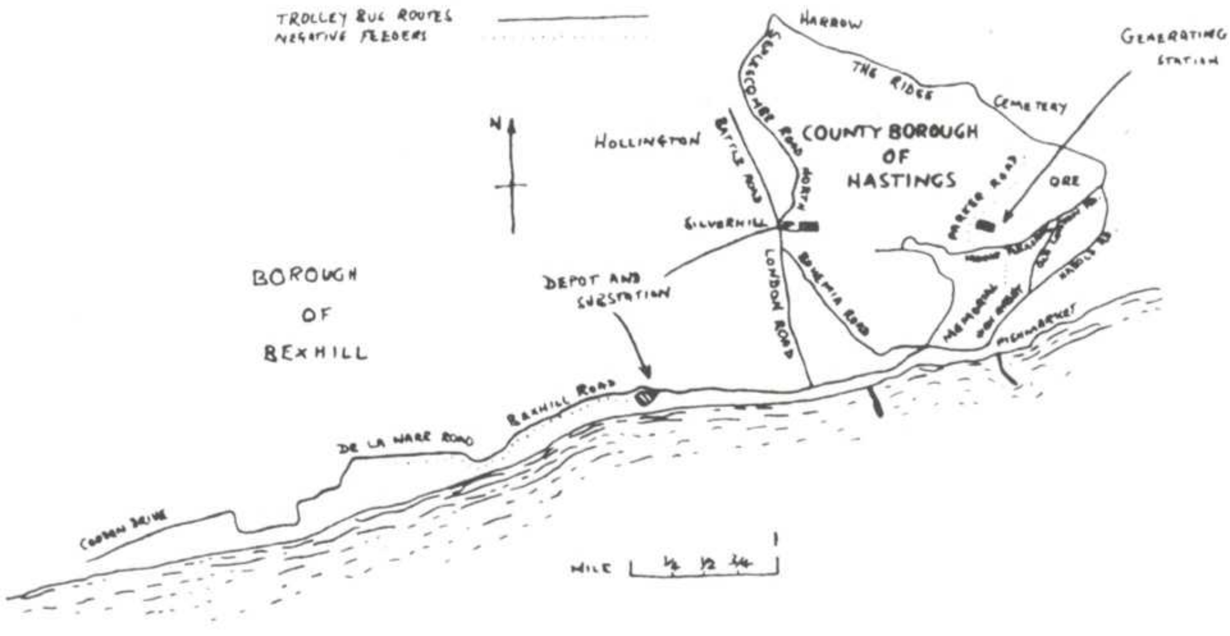
It is clear that the undertaking was very much self-contained in that it had built its own generating station in Parker Road and provided depots in Silverhill and Bexhill Road. Maintenance of all the vehicles was carried out at Silverhill where there were very well equipped workshops including a foundry where fittings for the overhead gear were produced.

Conversion from tramcars to trolleybuses had involved considerable work locally such as alterations to the overhead wiring to provide both positive and negative feeds whereas the tramcars had only required one pick-up from the overhead, the return being made through the tramrails. Considerable adjustment was needed on the part of the drivers who had to change from controlling a vehicle steered by its rails in the road and accelerating and moving rather slowly to a more sophisticated vehicle with steering wheel, compressed air brakes and rapid acceleration. The trolley booms were subject to de-wirements at points and crossovers and each vehicle carried a long bamboo pole so that a boom could be replaced on the wires when it had come off.

When a boom was de-wired, incidentally, it rose regally above wire level rather than fell down to bus level owing to the strong spring loading at the base of the boom.

The scheduled speed of trolleybuses at the time was 10 miles per hour against the 7 or so for trams and operation costs had fallen from 13d per mile for trams to 9d or 10d per vehicle mile for trolleybuses, although this might have had as much to do with the economics of the day as the genuine efficiency of the system. The conversion was put at £1,383 per mile of route.

FIG 4 HASTINGS TRAMWAYS COMPANY
TROLLEY BUS ROUTES



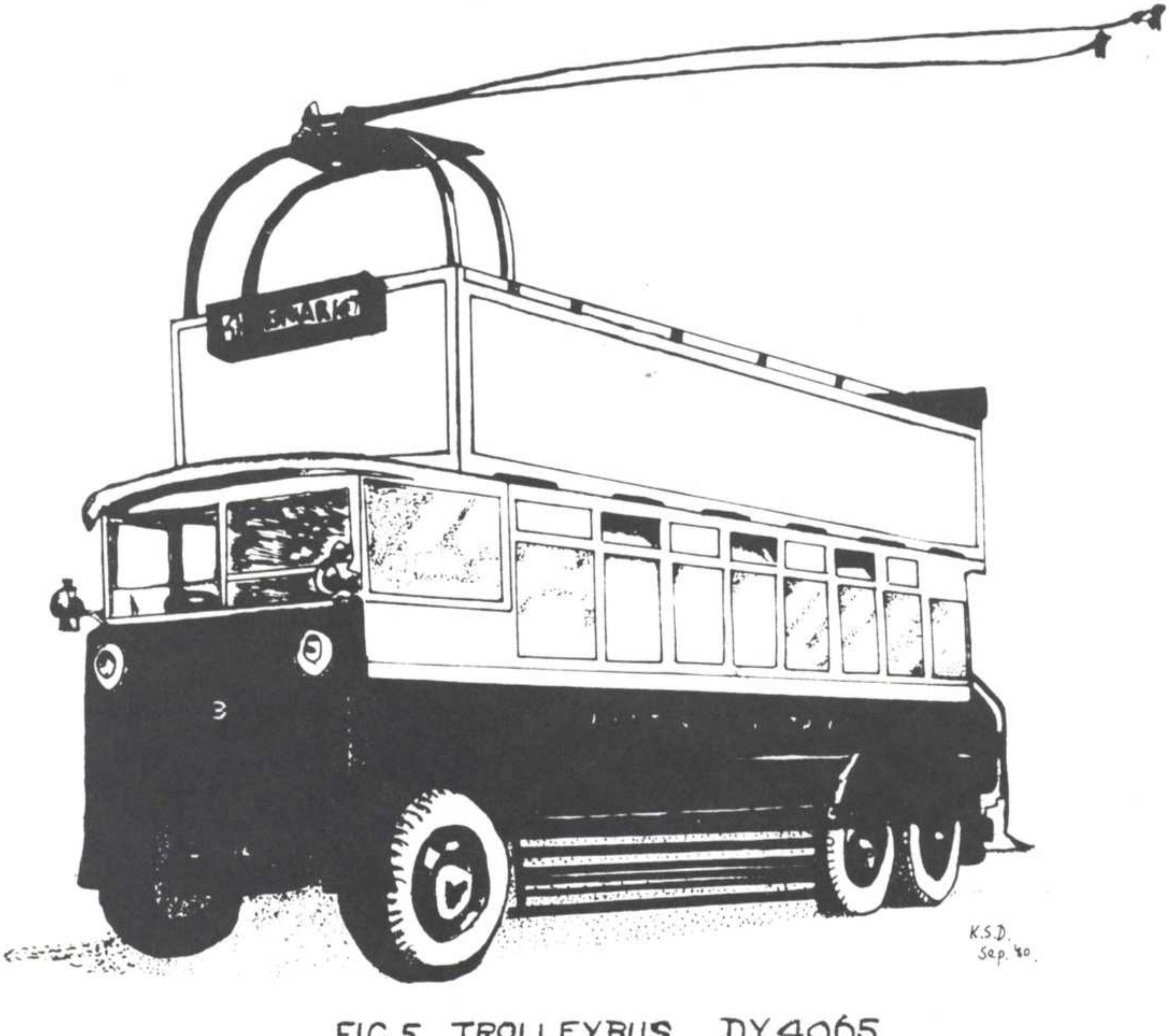


FIG 5 TROLLEYBUS DY4965

In 1935 Maidstone & District Motor Services Ltd., purchased the whole of the share capital of the Hastings Tramways Company and from this time on the undertaking operated as a subsidiary of that Company until 30th September, 1957, when it ceased to exist as a separate body.

One of the early changes was the alteration of the vehicle livery to the dark green and cream of the Maidstone & District Company although the Fleet name of Hastings Tramways remained on the vehicles until 1957.

1936 saw the closure of the Company's power station in Parker Road, current subsequently being purchased from February onwards from the then existing Municipal Power Stations of Hastings and Bexhill, and three years later a new fleet of trolleybuses was ordered with the first 20 entering service on 1st June, 1940. These were four-wheeled double-deckers of A.E.C. manufacture with 54 seat body-work by Weyman or Park Royal. Their arrival enabled all 8 existing double-deckers to be replaced along with some of the single-deckers and of the 8 originals all except DY 4965 were broken up at the Silverhill Depot that year. DY4965 was converted to a mobile workshop vehicle and fitted with batteries in the lower saloon to provide power to enable the vehicle to be driven away from the overhead. It was used this way until withdrawn and stored at Bexhill Road Depot in 1947.

In the meantime 6 of the single-deckers were sold to Nottingham Corporation in 1941, 6 to Derby Corporation in 1942 and others to other fleets in the country. Some were broken up and others disposed of to be used in various parts of Kent and Sussex as holiday homes or similar. One survived for many years in the Coach Station at Hastings operating as the booking office, stripped of its electric traction and control gear and devoid of wheels. This vehicle still exists in the ownership of the National Tolleybus Association and hopes have been expressed from time to time that it may be restored.

To turn our attention again to DY 4965 (Fig.5), it was removed from storage in 1952 and restored for seasonal passenger service being repainted in the original livery and renumbered as Fleet No.3a. For the Coronation in 1953 it was decorated with coloured lights and a garland, carrying passengers between the Bathing Pool and the Fishmarket along the full length of the sea-front. Because of its popularity with tourists and residents it was used in this way during each summer season until the trolleybus system was abandoned in 1959. By that time the garland had been replaced with a cut-out figure of King Harold of 1066 fame and the slogan "Born 1928 and Still going Strong" decorated the front of the bus which soon acquired the nickname "Happy Harold".

In the meantime, the Maidstone & District Company absorbed the Hastings Tramways Company completely and it ceased its separate identity on 30th September 1957.

The Bill presented in 1956 to wind-up the Hastings Tramways Company also sought to convert the trolleybus system to motor bus operation. There was substantial adverse local reaction on the part of both the Council and the users and a "Save our Trolleys" campaign was launched. However, eventually, after negotiation with the Company on concessions in terms of fixing local fares, giving some temporary reductions, and handing over traction poles to be used as lamp standards, the Council decided by a majority of only one vote to withdraw this opposition.

In August 1958 the Company announced its plan to replace the whole trolleybus system with new diesel buses and on 1st June, 1959 the final ceremonial run of the trolleybus system took place. At 11.45 a.m. trolleybus 3a (Happy Harold) followed by trolleybus 34 (one of the post-war fleet) left the Metropole, Bexhill and travelled via the Fishmarket to the Memorial, Hastings. Power was switched off and the service was no more.

Even at the time of closure however, some 25 years after the undertaking reached its peak in the thirties the staff and the system had a high reputation for reliability, efficiency and smartness. At the time of closure many of the staff had completed over 40 and 50 years service.

Trolleybus No. 34 went to Maidstone and is now held by the London Trolleybus Preservation Society at the East Anglia Transport Museum at Carlton Colville, near Lowestoft.

Fleet No. 3a, DY 4965 was not discarded and was taken to the Maidstone & District's Central Works in Postley Road, Maidstone, where the electric traction motor and control gear were replaced with a Commer TS3 two-stroke diesel engine and manual gearbox. Dynamos were fitted to power the lights and the vehicle was once more able to carry passengers on their sea-front outing. 1968 saw its final withdrawal from service and subsequently it has only been used on special occasions.

In 1974/5 enthusiasts from the Maidstone & District and East Kent Bus Club and the Maidstone & District Company jointly restored the vehicle to as near original condition as possible and removed the decorative lights and slogans. It has since appeared at a number of Vintage Vehicle Rallies and gatherings as well as carnivals, collecting awards in doing so.

In 1979 the Maidstone & District Company decided to dispose of DY 4965 and eventually agreed to sell it to Hastings Borough Council who took it over in July 1980. The Borough Council intends to preserve the vehicle in its restored condition because of its long association with the town and to use it for publicity purposes. The Maidstone & District and East Kent Bus Club will continue to enter it for rallies and gatherings and it is hoped that it will once again become a familiar figure in the area.

The sketchplan accompanying this article indicates the main features of the system as they existed in 1931 showing the routes operated and Depots owned by the Company, and the drawing is reproduced from a photograph of one of the original fleet shortly after delivery.

Buses, of course, have always had their enthusiasts and it is because of this that the history of the Tramways Company in Hastings is well documented. I am very grateful to Mr. David Padgham for allowing me access to his collection of material. Mr. Powys (another enthusiast) at the Hastings Reference Library was also most helpful. I have drawn heavily on articles by J. Gillham and G. Gundry and it is intended to publish an article on the origin of the Hastings Tramways Company together with details of the system prior to 1928 in the next issue of <u>Sussex Industrial History</u>.

Nevertheless material supplied by transport enthusiasts, detailed as it is, obviously tends to concentrate on the vehicles themselves, route numbers and matters such as time-tables. There are in fact a good many relics of the trolleybus system still visible in Hastings. Many of the traction poles were made over to the Council for use as lamp standards and are still in use today. Wall fittings to carry wiring are still visible in places.

The Silverhill Depot is still used by the Maidstone & District Company and although the generating station in Parker Road has long gone, the buildings of the Depot in Bexhill Road still exist and are used by a Company selling liquid petroleum gas. Many of the staff, now retired, still live in Silverhill and a proportion of the Company's present employees have clear recollections of the trolleybus days.

THE USE OF CLAY AT ASHBURNHAM BRICKWORKS

By Jack Harmer.

An article in the first volume of Sussex Industrial History, entitled "The Ashburnham Estate Brickworks 1840 - 1968" by K. C. Leslie described the brickmaking process at the yard. A report on the associated tileworks was promised for a future issue and that is what the present article sets out to provide.

The Difference between 'Loam' and 'Clay'

Probably from the earliest days of English brickmaking, the word 'clay' has been used to describe the medium from which bricks are made. However, this is to a large extent a misconception, certainly as far as Ashburnham Brickyard was concerned.

The silica content of the subsoil used for brickmaking, termed 'loam', was as high as 75%, making a highly suitable, mild 'pug', which shrank very little on burning. But the subsoil used for tiles had little silica in its composition (less than 25%). It is true to say that, while the brickmaking loam would have been quite useless for the making of tiles, fittings and land-drains, it would have been equally impossible to make bricks with clay, at least with the hand-making methods which were used. In view of its low silica content, the clay was in every respect more difficult to handle, being extremely sticky to prepare and with much higher shrinkage throughout.

The word 'clay' henceforth will be used to refer only to this low-silica material.

Obtaining the Clay

Until 1840, when the brickyard was at its old site at the Forge, the clay was obtained from a field on Peans Farm (TQ 689163). When the yard was moved to its final site, clay was obtained from the Clayhole Field on Ponts Green Farm (TQ 683157) half a mile to the south of the brickyard. Loam for brickmaking in each case was, of course, obtained on the actual site of the yard.

Clay was usually dug in the winter. Twelve inches of topsoil were removed, exposing on average four feet of suitable clay. This was dug in 'spits' with a special narrow spade called a 'graff'. This constantly had to be dipped into a bucket of water because of the sticky nature of the clay. The spits, which were so stiff that they remained intact, were loaded into a cart, seven loads being a day's work for one man, horse and cart. On arrival in the yard, they could be stacked quite neatly in the clay ring, using a type of Canterbury hoe, a three-pronged fork with blunt tines set at right angles to the haft. About 40 cartloads were required to fill the ring. The clay then lay exposed through the winter, allowing the frost and other elements to work on it, a natural helping hand in the final preparation.

Preparing the Clay

The clay ring was a shallow bowl approximately 24 ft. in diameter lined with bricks, in the centre of which stood the grinding mill (Fig.6). At the end of April each year, about a week before the making of plain tiles usually started, clay preparation began. A quantity of clay was pulled down from the main lump on to a space left for the purpose on the brick floor of the ring. Buckets of water were thrown over it, hard lumps were chopped up with a shovel and the resultant slurry thrown into another heap. This process was repeated until enough had been prepared for a day's grinding. The heap of soaked clay was then covered to prevent any further wetting or drying and left for three days for the clay to become thoroughly impregnated with water. The heap was then turned once again with a shovel. No more water was added, but a bucket full of water was in constant use as a lubricant for the shovel. After the second turning, the heap was again covered and left for a further three or four days, by which time it was ready for grinding.

The term 'grinding' was always used, although the process did not involve any crushing of stones. It was rather a process of churning the clay and expelling air. The mill was situated in the middle of the ring. It consisted of a large cylinder 2ft. 6 in. in diameter and 3 ft. 6 in. high, with an oblong hole measuring 7 in. by 10 in. at the bottom. Inside the cylinder was a set of five knives, each $4\frac{1}{2}$ in. wide and set at an angle on the shaft in the centre. Attached to the top of the shaft was a timber pole which stretched to the perimeter of the ring and to which a horse was tethered.

The prepared clay was put inside the open top of the mill. The horse, upon being told to 'gee up', walked round and round the perimeter of the ring pulling the pole behind him and so operating the mill. The knives rotated inside the cylinder, churning the clay and forcing it downwards until it was finally pressed through the hole at the bottom. Two men were required for this work. One had to keep the mill continually filled with clay and see to the horse. The second man had to deal with the ground clay. When this had been squeezed through the hole to a length of approximately 18 in., it was cut off with a special tool. The lump, which dropped into a pit beneath the mill, measured about 7 in. by 10 in. by 18 in. and was known as a 'wedge' of clay.

The wedge was picked up by hand and taken to a table which had previously been sanded. Here it was shaped up and then carried to the tile-house, a brick-built shed, the damp walls of which ensured that the clay retained its moisture. A day's grinding produced just over 200 of these wedges, which would in turn be enough to make approximately 7,000 plain tiles, about a fortnight's work for one man.

Moulding Plain Tiles

All tiles were hand-moulded, the procedure being basically the same as for bricks. A beech-wood stock was attached to the table. The mould, also made of beech-wood, fitted over this and rested on four screws in the table, which could be adjusted to ensure that the mould projected the requisite amount above the top of the stock (about 9/16 in. for a plain tile). A slightly concave shaping was given to the tile by scraping the stock with a special tool for about 2 in. around the edge, leaving a slight rise in the middle. Shrinkage of about 12% took place when the clay was burnt and the internal measurements of the mould had to allow for this. Thus, to produce a tile $9\frac{3}{4}$ in. by $6\frac{1}{2}$ in. by $\frac{1}{2}$ in. it was necessary to use a mould measuring 11 in. by 7 in. the thickness of the tile being regulated as already explained.

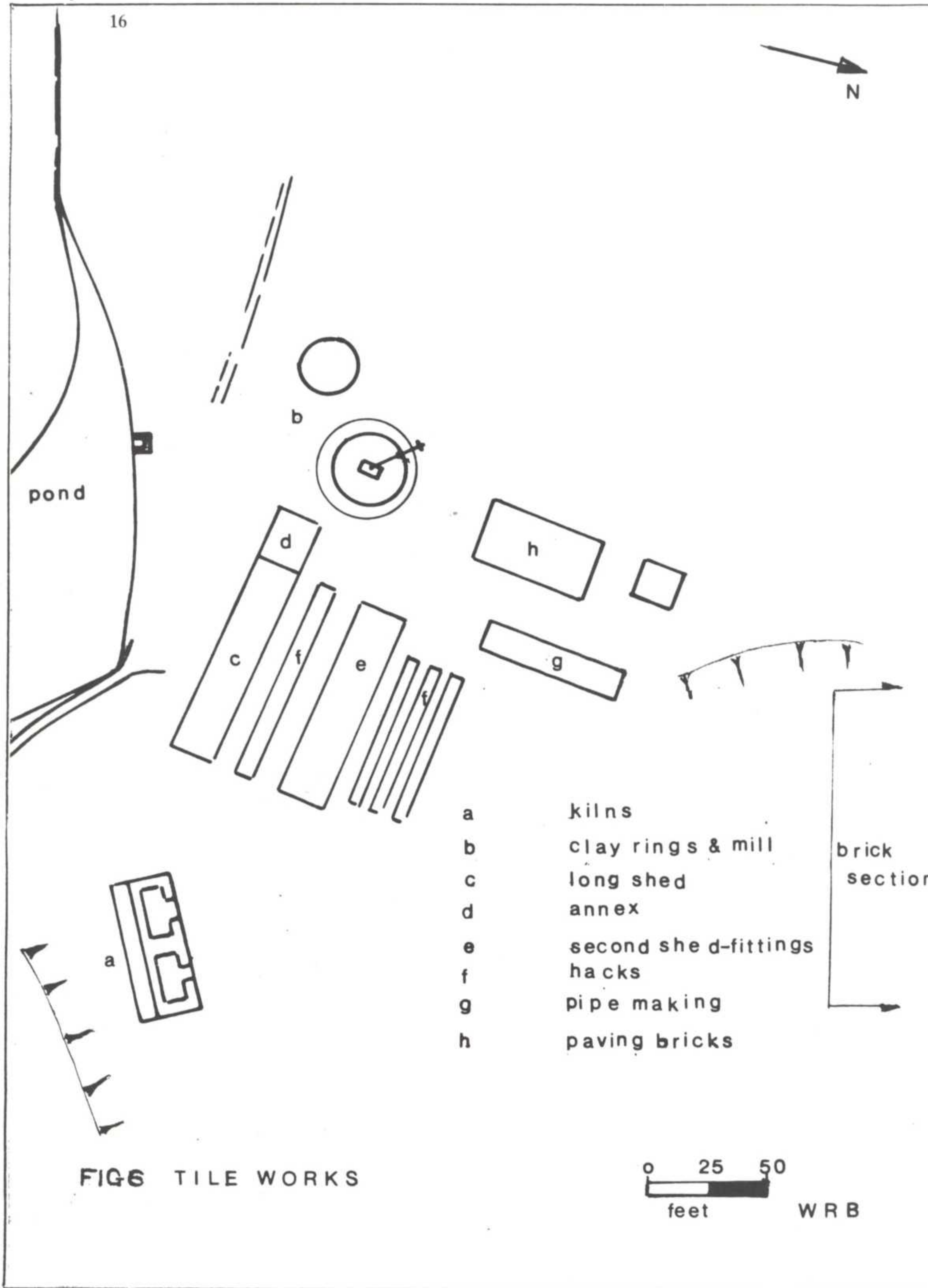


FIG6 TILE WORKS

A 'wedge' of clay and a bodge (wooden box) filled with sand were placed on the moulding table and work could begin. The mould was sanded and a quantity of clay pressed into it. The surplus was then struck off the top, leaving a level surface, but when the mould was lifted off the table and the tile inverted on to a board, it was slightly hollow in the centre. Twenty-five tiles, know collectively as a 'quartant', were placed one on top of each other and by the time the last tile was in place, the hollow had become quite pronounced. This hollow was referred to as the 'housing'.

The sanding of the mould was important, not only because it prevented the clay from sticking and made removal of the tile from the mould easier, but also because the final colour of the tile was affected by the type of sand used. For red tiles, sand straight from the pit on the estate, called the Sandhole, was used, whereas for dark tiles, black manganese was mixed with the sand; a small flower-pot full would colour a bodge full of sand, sufficient for about 350 tiles.

Both red and dark tiles, though commonly called plain or sometimes clay tiles, were also referred to as peg tiles. This was because they were hung on the roof by a peg instead of a nib, which is used on other types of roofing tile. Until the latter part of the 19th century, these pegs were made of wood $\frac{1}{4}$ in. square by $1\frac{1}{4}$ in. long. The holes for these were made in each tile before it was removed from the stock, being punched in by hand with a square piece of wood. With the advent of the metal tile pin, round holes could be used and the process speeded up. A metal bar on a swivel was fixed on the moulding table at one end of the mould and stock. As each tile was made, this bar was brought sharply down on to the head of the tile, punching both holes simultaneously.

<u>Drying and Burning the Tiles</u>

On completion of each quartant, the tiles were lightly sanded and carried into the adjoining drying shed. Here there were three rows of boards resting on bricks, one down each side and one in the middle, and the tiles in their quartants were put down on these. Anything made of clay, especially plain tiles, had to be dried slowly. It was the handed-down theory that, should they dry too quickly, they would become brittle, even to the extent of being so when burnt. Consequently the drying shed, although open-sided, had shutters which could be lowered in the event of an exceptionally drying wind.

When the tiles became dry enough to handle, they were 'chequered' or put down in fives, in staggered rows, which created spaces through which the air could circulate. More would be placed on top in a similar manner until a height of 15 groups of chequered tiles had been reached in each row. Drying time varied. Plain tile making usually lasted from May until August and tiles made earlier in the season dried faster than those made towards the end. Even so several weeks were required before they were dry enough for burning.

Tiles were burnt in the same kiln as bricks, but always in the top third of the kiln, where there was no great weight on them and the heat was not so intense, the peak temperature being around 1,000°C. 12,000 plain tiles were needed for one kiln and before they were put in, the bricks in the top layer were laid flat to form a floor (all the rest of the bricks were stacked on edge). One row of bricks was placed on edge down the middle of the kiln and between this and the walls the tiles were stacked on edge, as tightly as possible to prevent movement, the spaces for the hot air to circulate being provided by the housing, i.e. the slightly concave shape of each tile. Even so, problems could occur. When the tiles were shrinking and sinking as the temperature in the kiln rose, unless they sank evenly in their rows, occasionally a tile would twist and this would cause the whole row to do likewise, distorting all of them.

Making Fittings

The tile range comprised plain tiles, taper tiles for oast houses, large tiles (or tiles-and-a-half as they were called), ridge tiles, both half-round and sharp, valley tiles and corner tiles. The special tiles, known as 'fittings', were always made at the end of the season, the reason being that, in relation to the number of plain tiles needed, a much smaller number were required. Furthermore, these tiles were set out to dry individually and so drying time was considerably reduced.

The method of making fittings was similar to that employed for plain tiles. In the case of ridge tiles, the mould measured 14 in. by 11¼ in. and it projected about 5/8 in. above the top of the stock, thus producing a thicker as well as a larger tile. This was not lifted off on to a board. Instead the mould was removed, leaving the tile lying on the stock. It was slid off, using two hands, and placed over a semi-circular plywood support. In this way it began to take its rounded shape. It was then taken in to the drying shed, placed on boards and the support removed, the clay being sufficiently stiff to allow the tile to stand on its own. When time had been allowed for a certain amount of drying, the ridge tiles were 'dressed'. This entailed placing each one on a 'horse', a semi-circular block of wood on legs. Here it was patted into its final shape with a wooden tool similar to a short cricket bat. It was then lifted off on to a rack and left to dry.

Corner and valley tiles were made in a similar manner, only the mould and stock were of quite a different shape. This was almost triangular, measuring 11 in. on each of two sides, 3¼ in across the top with a curved base of 18 in. After each tile was made, it was draped over a triangular block of wood and finally dressed to the correct shape on a horse. The same mould produced both valley and corner tiles, the difference in shape coming when they were given their final dressing. The corner tiles were dressed on a much sharper horse than the valley tiles and, in addition, each had a hole made in the top so that it could be pinned into position on the roof of a building.

Ridge tiles were the most difficult to make; to finish 200 between 7 a.m. and 5 p.m. was considered to be a good day's work. Corner and valley tiles were easier to make and 300 of these could be completed in the same time. Plain tiles, in contrast, could be turned out at the rate of 750 a day, although to do this it was necessary to start at 6.45 a.m. depending to some extent on the consistency of the clay. Certainly, to keep up these rates left the maker little time for reflection! Tile-making was paid for on a piece-work basis: 9s. per 100 for fittings, against 14s. per 1,000 for plain tiles and 16s.6d. per 1,000 for bricks.

Fittings were burnt at the very top of the kiln because of their awkward shapes. Great care had to be exercised when stacking them, to obtain the maximum number of best quality products. However, some inevitably would twist and some would have fire-cracks, no matter how well they were stacked. Nor did it seem to matter whether they were slightly damp or completely dry when put into the kiln.

Making Land Drains

Another product of the yard was agricultural drainpipes. These were designed not so much to carry water from point 'A' to point 'B' as to drain wet places in a field or a wood. They were made on a pipe-machine which was simple but highly efficient in operation. It was of the extrusion type and could be modified to produce pipes of 2 in., 3 in. 4 in., 6 in. or even 8 in. diameter. Wedges of prepared clay were put into the box and the lid clamped down. A ram, operated by a reciprocating handle, forced clay through twin perforated metal strainers of 3/8 in. mesh and then through the required sized die on to a channel, which was lubricated with water. This was known as 'pumping out'. When the extruding pipe reached the end of the channel, which was approximately 13 in. in length, it was cut off by a fixed piece of wire. As the pipe lay on the channel, a wooden plunger, kept in a bucket of water in readiness, was pushed into the end of it and the pipe was lifted, carried and turned up vertically on to the concrete floor of the drying shed. The plunger was then removed, leaving the pipe standing on its own.

One box of clay would produce thirteen 3 in., nine 4 in. or five 6 in. pipes, these being the sizes most commonly made. To make the smaller sizes, usually a man and boy would work together, the man filling the box and pumping out, while the boy set the pipes off, put them in shape if necessary and made sure that there was an adequate water supply for lubrication of both plunger and the channel. Production for a working day (7 a.m. to 5 p.m.) for man and boy would be approximately 1,200 3 in. pipes. The 6 in. pipes were always made by a man working on his own, as it was very much heavier work. A box of clay produced only five pipes and had therefore to be filled more often. Also the weight of each pipe to be 'set off' put a very much greater strain on the wrists. To make 200 of these was considered a good day's work.

All pipes were made late in the season. They were mainly dried inside the shed, although to speed up the drying process, the 6 in. pipes were often taken outside on to the brick hacks. However, they had to be covered in the event of rain or at night. Anything made of clay (or loam, for that matter) had to be safeguarded from frost before burning. When dry, or almost dry, the pipes were placed in the kiln. They were always the last things to be put in and they stood vertically. One layer at the top of the kiln would consist of either 1,200 3 in., 800 4 in. or 400 6 in. pipes. Usually these would burn successfully, although occasionally some would crack down their entire length, due maily to being stacked in the part of the kiln where the flame was fiercer.

Clay Flower Pots

Clay flower pots were also made in the brickyard at one time, but not within the writier's memory. For these, a special washing process was required to free the clay from any impurities. Stones, sometimes left in the clay used for tiles, could cause cracks, due to the stone remaining neutral when the clay shrank during burning. For flower pot making, stones had to be eliminated, not only for this reason, but also because the pots were spun on a wheel. For the washing process, a small, brick-lined ring was used, similar to the large clay ring, but with channels through which the clay, in suspension, was run off, leaving stones and any other foreign bodies behind. A full range of flower pot sizes was made, but quantities can never have been great, as they were for use only in the gardens and green-houses at Ashburnham Place.

The Lay-out of the Tileworks

The smaller ring shown on the site plan of the works is the one for washing flower pot clay. The larger one is the main clay ring, which contained the grinding mill. In the long shed nearest to this were the tilemakers' tables. There were two of these for making plain tiles in the annex, and two more inside the main shed, one for making ridge tiles and the other for corner and valley tiles. The rest of the long shed was used for drying plain tiles. Between the two parallel sheds is a concrete base for standing tiles out of doors, but this was not often done. The second shed contained racks for drying fittings and drainpipes. The three rows of hacks beyond this shed were for drying 2 in. paving bricks, which were moulded in one of the sheds which stands at right angles to the hacks. The other shed housed the pipe-making machinery. Although the kilns were shared with the brick works, the lay-out was so constructed that there was direct access to them from both areas. The water supply was quite primitive and simply involved buckets being filled at a point beside the pond and carried on a shoulder yoke some 20 yds. into the works.

(The writer first worked in the brick works during his school holidays. He was employed there full time from 1930 onwards, working principally as a tilemaker until tile and pipemaking came to an end in 1961. From 1955 until the brickworks closed in 1968 he was also works foreman.)

A Historical Footnote

By W. R. and M. Beswick

The earliest known date for tilemaking at Ashburnham is 1362, when there was a 'building called a Tylehouse for baking tiles'(1).

By the 17th century, when the Ashburnham ironworks were in full production, both bricks and tiles were being made in quantity. In 1682, for example, 14,700 bricks and 4,000 tiles were supplied to the furnace from the Earl of Ashburnham's kilns, and in the following year 38,900 bricks were required for 'the new Boring House'(2). An interesting use of clay (as defined above) may be noted in this connection. In March 1780, the brickyard supplied the furnace with 300 tiles, 1,600 double bricks, 3,700 common bricks and also 3,700 bricks mixed with clay (3). The inference which may be drawn is that it had become apparent that a high-silica brick was unsuitable for blast-furnace use, particularly where limestone was added to the furnace burden as a flux, and therefore a brick with a higher alumina content was needed. Hence the admixture of clay in bricks for the inner lining of the furnace.

Drain tiles were added to the range of products early in the 19th century, at a time when agricultural improvements of all kinds were being encouraged. A survey of the estate made in 1830, ten years before the brickyard was moved to its final site, pointed out that the heavy soil of the district could be much improved with drainage. In fact some work of this kind had already been carried out, as the surveyor writes: 'Upon enquiry into this matter I learn it has been the practice very lately to allow the tennants willing to use draining tiles to have them from the kiln at half price, they being at the expense of laying them down'(4). Drain tiles bore little ressemblance to modern drainpipes. They consisted of a series of 'soles', or flat tiles, laid in the ground with tunnel-shaped tiles placed on top of them. The latter were made by bending large, flat tiles into a U-shape before firing, probably by dressing, as described above.

In 1852, a set of 'Ainslie's patent drain tile models' were purchased for the brickyard(5). This follows the acquisition of an 'Ainslie's Brick & Tile Machine' in 1847 and suggests that some mechanisation was introduced into the production of bricks, tiles and drain tiles in the mid-19th century. In 1871, what is described in the accounts as a 'brick and tile machine' was bought from James Tester, the ironfounder at Hurst Green, but it seems probable that this was in fact a drainpipe machine, as the first sales of 3 in. and 4 in. pipes are recorded in 1872 and various spare parts, such as die plates, cores, strainers and racks were purchased from Oakleys, the agricultural engineers who later took over Tester's business (6).

The introduction of dark tiles to the range of products took place at about the same time, the first purchase of 'colouring for plain tiles' being recorded in 1869. About 3 cwt. of manganese were used each year during the latter part of the century and dark tiles sold at 2s. per 1,000 more than red ones (32s. and 30s. respectively in 1879).

Flower pots were first mentioned in the accounts in 1865, when C. Nicolls was paid for making them. This is the only specific payment made for this work as, once flower pot making had been introduced, it became a tilemaker's job. Flower pots 'for the Gardens account' continued to be mentioned until the early years of the 20th century and in addition, in 1905, 'pans for the Game account' figured as well, but neither appears again when production was resumed in the yard after the end of the 1914-18 war. The last man known to have made flower pots was Harry Barden, who was yard foreman from 1900 to 1925.

It cannot be said with any certainty when the use of the brick and tile machine was abandoned. Hand-moulded bricks were produced alongside machine-made ones in the latter part of the 19th century, the accounts for 1879, for example, listing 'bricks' at 32s. per 1,000 and 'moulded bricks' at 40s. per 1,000. Of the tile range, fittings, at least, must always have been hand-moulded. In 1926, when there were some signs of increased activity in the yard, the estate carpenter spent three weeks making new brick moulds and it seems likely that a return to hand-moulding of all bricks and tiles was made at that point, if not before. The pipe machine, of course, continued in use until pipe-making ceased altogether.

References

1. Sussex Industrial History Vol. 1 (1970) p.21 note 5, quoting L. F. Salzman, English Industries of the Middle Ages.
2. East Sussex County Record Office (ESRA), account books of the Ashburnham ironworks: ASH 1817 f.595 and 607.
3. ESRO ASH 1815 f. 571. (I am indebted to D. W. Crossley for drawing my attention to this and the foregoing reference).
4. ESRO ASH 1173, Edward Driver's survey of the estate.
5. The references to brickyard expenditure and sales which follow are taken from i) ESRO ASH 2028, Brickyard accounts for 1872-1884 ii) ESRO ASH 1743-1771, Steward's account books for certain years between 1847 and 1925 iii) ESRO A1434, Steward's account books completing the foregoing series to 1927.
6. ESRO A2596, account books of Albert Oakley Ltd.

THOMAS DURRANT, MILLER, OF MERSTHAM (SURREY) AND IFIELD (SUSSEX)

By Paul W. Sowan

A Thomas Durrant appears to have purchased the watermill at Ifield for £1,800 in 1817. The mill was demolished and re-erected at about the same time, but it is not clear if the purchase price was for the mill as re-built, or if the re-construction was undertaken at additional expense after purchase (1-4). A Thomas Watkins Durrant is shown as master miller in the 1851 census for Ifield as having been born in Merstham. How Thomas Durrant found the considerable sum of money required for the purchase of Ifield Mill has been something of a puzzle. Litigation between one Thomas Durrant, miller, of Merstham and Messrs. Jolliffe and Banks, who operated an underground stone quarry in that parish, in 1810, reportedly led to Durrant being awarded damages of £2,200 as compensation for the accidental diversion of his water supply (9). However, although such a sum readily explains this or a related Durrant's ability to purchase the mill at Ifield, it is puzzling that so great a sum of money for damages is not mentioned by contemporary sources reporting the cause of the interruption of the water. Clearly, there is a case for closer enquiry into the circumstances.

Farries & Mason (3) report two water mills and one windmill in Merstham, although the eastern watermill appears to have gone out of use before the end of the 18th century. A Thomas Durrant leased the western watermill, at Merstham village, from Lady Day, 1784, for 62 years at £28 p.a. He also erected nearby a post windmill, in about 1786 'as far as can be estimated'. This mill was demolished to make way for the making of the London, Brighton & South Coast Railway's new Quarry Line in 1896, and its remains, including an octagonal cast-iron shaft, timber, and stones, were used to construct the unusual lych gate for the churchyard. The Merstham parish registers, which have been published (8), indicate a number of members of the Durrant family of whom several were both named Thomas and were millers, so it is not clear which Thomas Durrant was concerned at each stage of this saga.

Building stone from the Upper Greensand beds had for centuries been worked in underground quarries at Chaldon, Merstham, Godstone and Reigate at the foot of the North Downs escarpment (6, 7), and in the late 18th century it appears that the focus for this industry was shifting back from Godstone and Chaldon to the neighbourhood of Quarry Dean Farm, east of Merstham Church. Jolliffe & Banks' development of the stone quarries and associated limeworks from 1805, and the construction of the southern terminus of the Croydon, Merstham & Godstone Railway (a horse-powered plateway) in the same year, added impetus to Merstham's mineral industry, exports being now much facilitated to Croydon and London by way of the railway through the Merstham gap. However, development of the underground quarries was severely handicapped by ground water and flooding. Jolliffe & Banks therefore had made a most ambitious drainage adit which ran from low-lying land below the village mill several hundred yards through the ridge along which Rockshaw Road now runs, to intersect and drain the flooded galleries. Made through Gault Clay (a bed notorious for its mobility) and apparently without intermediate working shafts, this masonry-lined adit was a most remarkable feat of engineering; tunnelling upwards in such ground under a flooded mine appears to have been accomplished without accident. The work took the best part of two years, 1807 - 09, and was complete by July 1809. Manning & Bray (1809) report (5), however, that 'just before the tunnellers entered the (underground) quarry, they met the sources which conducted the water to the part above the mill, by which means the water supplying the mill was diverted into another course'. Although the same authors refer to the adit again in their third volume (1814), they say nothing about Durrant's action for damages. As things turned out the adit had collapsed within ten years of its construction, and appears to have caused further difficulties by periodically clearing (presumably by an outrush of water under pressure) and collapsing during the following ten or twenty years. It is now blocked, though still apparently letting some water. Should it clear again, an outrush of water, clay and masonry can be expected onto the M25 motorway which passes the site of its southern portal!

The evidence for Durrant's outstandingly successful action for damages is, on the face of it, beyond suspicion. It takes the form of notes of important events in the parish written by the Rector in the back of one of the parish registers. These notes have been faithfully, accurately and completely published (for the years in question) by Woodhouse (1911). The Rector in question was Martin Benson, who held office from 1791 to 1883. He had more than a passing interest in the mill stream since it formed, whilst flowing in its proper course from spring to Durrant's watermill, a no doubt attractive feature of the rectory garden. His notes inform us that 'Apprehensions were entertained that the undertaking (that is, the drainage adit) would prove injurious to this spring; and accordingly, on the tunnel being opened in the early part of July in this year, the stream entirely failed. An action was brought by the miller, Mr. Durrant, against Messrs. Jolliffe & Banks, the lessees of the quarries, which was tried at Kingston, April 2nd, 1810, and after a trial of seven hours a verdict with damages was given for the plaintiff. This difference was afterwards adjusted on the terms of Mr. Jolliffe paying to the miller £2,200 as compensation for the injury sustained by the loss of the stream, and £200 more if it did not return in seven years.'

Attempts to find some documentary record of this extraordinary trial were at first unsuccessful, but some rather cryptic papers have now been located in the Public Record Office. These show that Jolliffe was concerned, at the same time, in a number of more trivial cases in which, however he was plaintiff rather than defendant, and which appear to have no bearing on the Durrant case. This latter case, at the Assizes of the South Eastern Circuit, resulted in Durrant being awarded £70 damages, with 40/-d costs - hardly enough to account for the purchase of Ifield Mill! Have we yet to find the main trial referred to by Benson? Was the £2,200 some sort of out-of-court settlement? Could Benson have confused two such sums, even though his notes appear to have been written-up retrospectively, perhaps from ten to twenty years after the event, and presumably from memory and or diaries? There is clearly scope for further research, if not into the size of the damages, then certainly into the origin of Benson's error (if this it was) and the source of the money for Ifield Mill.

The following information from the Marstham parish registers may be helpful in unravelling the Durrants' and other millers' parts in the story. A Thomas Durrant married, on 6th November, 1763, one Elizabeth Rigglesford, widow. It was presumably these two who were buried, repectively, on 6th March, 1779, and (perhaps after the birth of Thomas Watkin, vide infra) on 12th March, 1780. One or other of two Thomas Watkins Durrants, or possibly both of them if one died early and unrecorded in these registers, may have been sons of this marriage. The first Thomas Watkins Durrant, son of Thomas and Elizabeth, was baptized on 10th May, 1768; the second, likewise, on 5th March, 1780. The Thomas Durrant who leased the watermill in 1784, and erected the windmill about two years later, can hardly have been any of these. The first Durrant (or some other one!) had died in 1779; and the two younger ones would have been too young.

A further Thomas Durrant was born to Edward and Cleora Durrant on 17th October, 1798. And an Edward, otherwise Dennis, Durrant, miller, died aged 28 on 5th July, 1801. Marstham, in fact, lost two millers in 1801, the other being William Rigglesford, who died aged 59 on 8th August in that year; he was presumably related to Elizabeth Rigglesford, the first Thomas Durrant's wife of 1763!

Thomas Watkins Durrant, presumably one of the two born in 1768 or 1780, married Ann Wood on 1st May, 1806. Another Thomas Watkins, presumably the other of the pair, married Mary Blake on 6th January, 1807. Either of these could have been the Durrant involved in the litigation with Jolliffe & Banks, although the surviving documents cite no middle name (although Jolliffe's is given), so the litigant Durrant may have been the one who entered the milling business in c.1784/86.

A further Thomas Watkins Durrant was born to Thomas and Ann (? the Thomas and Ann who had married in 1806), on 20th December, 1810. He could perhaps be the Thomas Watkins Durrant of the 1851 Ifield Census return, although he would clearly have been too young to buy Ifield Mill in 1817. Ifield Mill was presumably bought by his father, or by his contemporary of the same name. All in all, Merstham appears to have had quite a flourishing family milling business, involving the Durrant and Rigglesford families and at the period in question at least two mills (one wind, the other water), which evidently transferred itself, in whole or in part, to Ifield in 1817. Whether Ifield Mill was purchased from capital accumulated over the years, or from a windfall from a cloud with a golden lining in 1807-10, is still far from clear.

References

1. Bracher, P. (1976) Ifield Mill: Its Owners and Occupiers, Sussex Family Historian 2 (7), pp.222 - 27

2. Durrant, Thomas vs. Willian John Jolliffe and Edward Banks (1810) PRO ASSI 32/5/7407

3. Farries, K.G. and M.T. Mason (1966) The Windmills of Surrey and Inner London. Charles Skilton, p.146

4. Gibson-Hill, J., E.W. Henberry and P. Bracher (1978) The Recondstruction of Ifield Mill: Part 1 - Historical Background. Sussex Industrial History 8, pp 12 - 16 and plates xv - xvi

5. Manning, O. and W. Bray (1809, 1814) The History and Antiquities of the County of Surrey. Volumes II and III

6. Sowan, P.W. (1975) Stone Mining in East Surrey. Surrey History 1(3) pp. 83 - 94

7. Sowan P.W. (1976) Firestone and Hearthstone Mines in the Upper Greensand of East Surrey. Proceedings of the Geologists' Association 86(4), pp. 571 - 91

8. Woodhouse, R.I., A.J.Pearman and T. Fisher (1902) The Registers of Merstham, Surrey. 1538 - 1812

9. Woodhouse, R.I. (1911) A Short Account of the Ancient Parish of Merstham in Surrey

WORTHING ELECTRICITY SUPPLY - 1893 to 1901

By Mrs. M. L. Morris

In 1891 Worthing was made a Borough and one of the first tasks of the new Borough Council was to consider the possibility of an Electricity Supply for the town. Although street lighting was usually the chief application for early electricity supply systems, in Worthing the first suggested application happened to be for something totally different.

The Hermite Experiment

Between May and August of 1893 the town suffered a severe epidemic of typhoid fever and Councillors became very concerned about the possibility of crude sewage from the outfall of a replanned sewage system being washed up on to the beach. Their attention was drawn to experiments being carried out in France by M. Hermite who had devised a scheme for treating sewage with electrolysed sea water and he was invited to come to Worthing to carry out a similar experiment. The invitation was accepted and the necessary electricity supply for the electrolysing process was provided by a dynamo driven by the Borough steam roller. Dr. Kelly, the Medical Officer of Health for the town and the British Institute of Preventive Medicine both carried out tests on the treated sewage and both declared that the process did not produce the results claimed for it; the Council therefore decided not to proceed with the scheme. It did, however, at a cost of £200, give Worthing international publicity and provided the town with its first application of an electricity supply.

The First Electricity Committee

While the results of the Hermite tests were being awaited the Council began to consider how to provide the necessary electricity on a larger scale and, as usual with Councillors, they looked to see what neighbouring Boroughs were doing and the Worthing Councillors did not have far to look.

Brighton's electrical history went back to very early days in that an Electric Light Co. had been operating there before the Electric Lighting Act of 1882. The Company had, however, gone into liquidation in 1885 but from the remains had arisen the Brighton and Hove Electric Company with Arthur Wright, a brilliant young engineer as Managing Director. This eventually led to the Brighton Municipal Electricity Undertaking which, having obtained the necessary Provisional Order, introduced street lighting in 1891; the scheme was financially successful and the undertaking was in a position to supply Worthing with useful facts and figures. Mr. Churcher, Editor of the Worthing Gazette had, in his paper, repeatedly attempted to stimulate interest in the applications of Electricity and was now stressing the success of the Brighton Undertaking.

Furthermore the Worthing Gas Company, which provided the street lighting, signified their intention of raising their charges to 4s. 6d. per 1000 cu.ft. This angered the Councillors and a special meeting was called for 20th March, 1894 at which Councillor J. H. Raffety presented a notion that a Committee be appointed 'to look into the desirability and practicability of the Borough being lighted by electricity'. The motion was carried unanimously. On a further motion, again by Councillor Raffety and seconded by Councillor Lyne the following Committee members were elected:-

The Mayor (Councillor R. Piper)
Alderman Cooksey (Dental Surgeon)
Alderman Linfield (Corn Merchant)

Councillor Haywood (Solicitor)
Councillor Raffety (Gentleman)
Councillor Capt. Fraser of the W. Sussex Yeomanry was elected later, (17th April, 1894).

The Committee held its first meeting on 10th April, 1894, when Councillor Raffety was elected Chairman. It may be noted that Councillor Raffety saw the project through to its completion and was standing beside the Mayor at 'Switch on' day seven years later in 1901. The Town Clerk explained the requirements of the Electricity Acts of 1882 and 1888 and the procedure for obtaining a Provisional Order from the Board of Trade for the public supply of electricity. One requirement was that the application for the Order had to be sent to the Board of Trade by 21st December in any year. The Committee had thus only seven months to prepare a scheme if they wished to have it approved by Parliament in the following session.

Pursuing the idea of finding out what other Boroughs were doing the Town Clerk was instructed to prepare a short questionnaire covering five points:

1. Are any streets in your Borough lighted by electricity?
2. Is it a Corporation or a Private Undertaking?
3. Is it satisfactory?
4. Does the cost compare favourably with gas?
5. To what extent is it used for business or household purposes?

Within a fortnight the Town Clerk had circulated this questionnaire to 52 Boroughs and received 39 replies. Every Borough that had replied had already taken out its Provisional Order, in 32 Boroughs electricity was either installed or some electrical activity was taking place - only seven had no plans at all. Councillor Raffety undertook to obtain information regarding cost of installing electricity and fitting out a generating station; also he undertook to decide upon a 'consultant electrical engineer of standing and experience'.

The Consultant selected was Professor Alexander Kennedy, FRS., MICE., MIMechE., one of the foremost electrical and mechanical engineers of the day. He was invited to attend a meeting of the Committee on 16th October, when the Mayor and Committee took him on a conducted tour of the streets and he was shown over the fine waterworks building which the Council was hoping could be converted into a generating station. In two weeks, on 5th November, 1894, Professor Kennedy presented his Report.

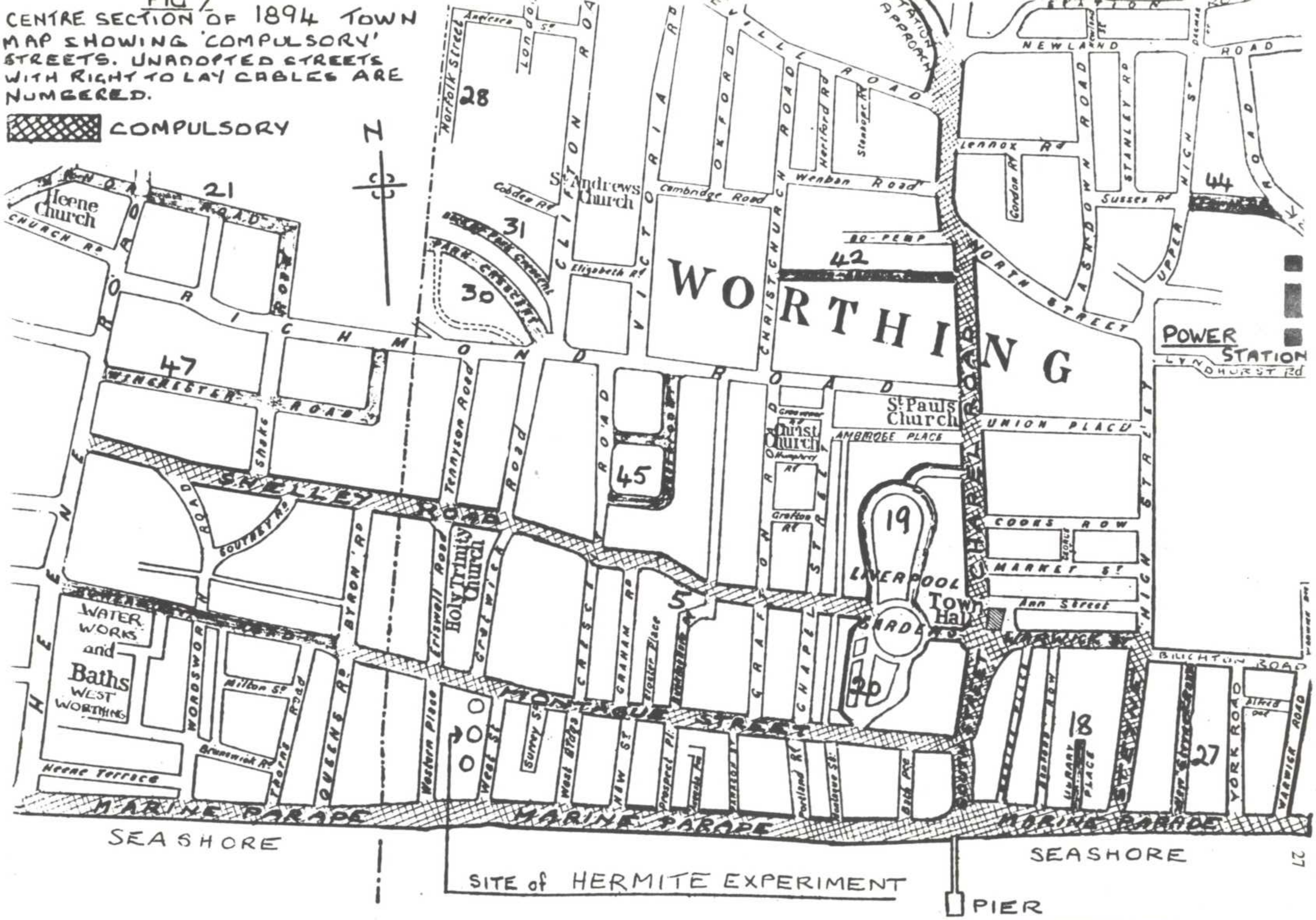
Professor Kennedy's Report

In granting a Provisional Order the Board of Trade laid down certain criteria to be met by the Undertaker. Firstly the area over which the Order was to apply had to be clearly defined (Schedule I), in this case the whole area within the Borough boundary. Secondly a list had to be submitted of specific 'compulsory' streets along which the Undertaker had to lay distribution mains within a period of two years from the date of the Order (Schedule II). Thirdly another list of streets was to be specified, the 'Unadopted' streets, along which the Undertaker would be given the right to lay distribution mains when necessary and as demanded by a given number of consumers (Schedule III). Fourthly, the Board of Trade must be informed regarding finance and the charges to be made to the consumers (Schedule IV).

Within two weeks of his visit to Worthing, Professor Kennedy submitted his recommendation, the following being the chief items.

FIG 7

CENTRE SECTION OF 1894 TOWN MAP SHOWING 'COMPULSORY' STREETS. UNADOPTED STREETS WITH RIGHT TO LAY CABLES ARE NUMBERED.



Professor Kennedy's Report (contd.)

The streets designated as 'compulsory' (Fig.7) were:

Marine Parade, from Warwick Buildings to Heene Road
South Street
Warwick Street
Chapel Road, to the railway station
Shelley Road
Montague Street
The Steyne

These had a total frontage of 2700 yd. occupied by shops and 5800 yd. occupied by private dwellings, largely standing in their own grounds, this being a feature in which Worthing differed from most commercial towns. The total length of 'compulsory' streets was thus 4.8 miles plus an additional mile to the suggested site for the waterworks generating station site in Upper High Street.

The Professor estimated that about 5400 lamps would initially be required of which a maximum of about 3000 would be operating at any one time. In addition to the above 48 arc lamps spaced at 60 yd. intervals were proposed for the Marine Parade and up South Street and Chapel Road to the railway station. To supply all these a power of 225 h.p.(170 kW) was suggested plus a further 100 h.p.(75 kW) as a reserve.

The waterworks site for the generating station was regarded as very suitable and had the advantage of a good chimney and an adequate water supply for the condensing plant associated with the steam engines. The existing steam engines and boilers and the main building were, however, regarded as quite unsuitable for the generating plant so that a new and more appropriate building on the available space at the site was suggested.

As the length of distribution mains was high relative to the number of consumers to be supplied a high voltage alternating current scheme was proposed operating at 2000 volts with a transformer on the premises of each consumer to step the voltage down to 100 volts. To avoid the necessity of running the main engines and generators at night when the load was very low it was proposed to install a battery-driven direct-current motor coupled to a small alternating-current generator of sufficient size just to supply the night load; the battery would be charged during the day or evening when the main generator would, in any case, have to be running. Arc lamps operate more satisfactorily on direct current than on alternating current so that it was proposed to supply these from the 2000 volt system through a rectifier which would convert from alternating to direct current.

The total cost of plant to supply 48 arc lamps and 5400 incandescent lamps each of 8 candle power was estimated to be £27 500 including all buildings and road works. It was also suggested that the work could be done more economically by employing the Council's own workmen than by a private contractor. Figures for the number of units of electricity (kWh) consumed per lamp per year in other installations varied from 13.5 in Bournemouth to 22 in Brighton; taking the lower figure the total consumption for 5400 lamps would be 72 900 units per year bringing in £2430 per year if charged at 8d. per unit (Professor Kennedy recommended asking the Board of Trade for permission to charge a maximum of 9d. per unit). Furthermore the estimated income from the arc lighting (paid by the Council) would be £880 per year so that, together with £150 for meter and transformer rents (paid by the consumers) gives a total income of £3468 per year. It was noted that the cost of the arc lighting is two and a half times the cost of the gas lighting which it would replace but about forty times more light would be obtained. Interest and sinking fund charges estimated at about 5½% per year on £27 500 is £1540 leaving £1928 available to cover the actual running cost of the generating station. Professor Kennedy suggests that this would be entirely adequate assuming an equivalent of 5000 lamps on circuit, a figure which he estimated should be realised after the first full year's working.

The Provisional Order

At a Committee meeting on 31st October, 1894, the last in their year of office, the Electricity Committee accepted Professor Kennedy's recommendations and his written report was submitted on 5th November. This came before the newly-elected Council on 9th November, 1894. The meeting was held in public and was fully reported in the Worthing Gazette of 14th November. There was some reluctance over the clause specifying the laying of the 'compulsory' distribution mains within two years, especially from Alderman Cortis but the report was accepted in full.

The application for the Provisional Order was despatched to the Board of Trade before the limiting date of 21st December and the Order was confirmed by Act of Parliament on 27th June, 1895. Four other Orders, for Carlisle, Pontypool, Walthamstow and Winchester were confirmed at the same time.

The Lost Years

The flurry of activity leading to the obtaining of the Provisional Order, regarded as one of the most positive steps ever taken by the Council, was followed by two years of relative inactivity. This period happened to coincide with the invention of the Welsbach gas mantle which greatly improved gas lighting and reduced its cost but it was the electricity which was credited with having caused the Gas Company to rouse itself and effect considerable improvements in the gas street lighting of the town; the Council meanwhile concentrated its efforts on paying for the new sewerage system which was then being installed.

While Worthing was marking time the nearby village of Broadwater revelled, at its customary Fair, not only in the novel brilliance of a steam roundabout lit by electricity but also in a powerful electric searchlight; this could probe the darkness surrounding the Green to the delight of the villagers and the embarrasment of the many couples there ensconced.

It was not until May 1896 that the Town Clerk called the next meeting of the Electricity Committee. Only two items were on the agenda - an offer from a Mr. Tasker to purchase the Provisional Order and put electricity into the town, which was turned down, and the problem of the clause in the Order requiring the Council to start work in two years; due to the cost of the sewerage scheme there was no possibility of this being done and the Board of Trade seems to have concurred in waiving this clause as no further work was undertaken during 1896.

A Fresh Start

In January 1897 Mr. Frank Roberts from Birkenhead (Fig.8) was appointed Borough Engineer and Surveyor and interest was revivied. Another offer, from a Mr. Rowe to purchase the Order was received but was also rejected and the Board of Trade was approached for an extension of the above-mentioned time limit of two years. It was then learned that the Board would be putting no statutory pressure on the Council in this respect and in fact no applications from outside bodies to take over the Order could be entertained before July 1898.

The Council thus had a year in which to come to a decision. Professor Kennedy was approached to see whether, after three years, he could reduce his estimates of cost; he replied that, due to improvements in incandescent lamps a saving of £4000 in installation costs and £400 per year running costs could be made.

A new and significant name appeared on the Electricity Committee in November 1897, that of Councillor F. E. Ovenden. A resolution was quickly passed by the revived Committee to the effect that 'This Committee is of the opinion that the time has arrived when the Corporation should take the necessary steps to supply the Borough with Electricity'. A sub-committee comprising the Mayor, and Councillors Raffety and Ovenden was appointed to examine various schemes and decide on the next move; they got in touch with Mr. Rowe, Siemens Bros. & Co., and the Municipal Electric Supply Co. and on receiving their offers asked Professor Kennedy to be their electrical adviser; he was, however, too busy at the time and suggested either Messrs. Burstall & Monkhouse or Mr. Swinburne, the former being finally selected.

By now the 'jungle telegraph' was in operation and many offers came in including one from Edmunsons Electricity Supply Corporation. By the end of April 1898 Messrs. Burstall & Monkhouse had reported on the offers from Siemens Bros. the Municipal Electric Supply Co., and Edmunsons Electricity Supply Corporation and there were only two months left before the Provisional Order expired.

The offer from Siemens Bros. & Co., was most in line with the Committee's requirements but involved parting with the Provisional Order which the Committee was reluctant to do. It therefore asked the Council to consider the following request - 'Would the Council consider it expedient to construct an Electric Light Works on the same or similar lines to those contained in the offer of Siemens Bros. & Co., the works to remain the property of the Council with a contractor to run the undertaking for them for a period of 5 to 7 years at a stipulated rental'.

The Council agreed to this and gave the Electricity Committee permission to go ahead. The next step was to decide on a Consulting Engineer and Professor Kennedy was again approached but had to decline. Mr. Arthur Wright of Brighton and Messrs. Burstall & Monkhouse (B. and M.) were considered, the decision eventually favouring the latter.

The Revived Electricity Committee

On 14th November, 1898, began a momentous year in the history of the installation of Electricity in the Borough. Councillor Ovenden was elected to the Chair of the Electricity Committee backed up by the Mayor, Aldermen Linfield and Piper, Major Fraser, Councillor Frost and the ever-faithful Councillor Raffety. The Committee decided to meet every Monday from then on. At their second meeting a letter from B. and M. was received suggesting that it would be advantageous to consider an electricity supply in the wider context of a Public Utility rather than solely for street lighting; also they suggested that if a refuse destructor were embodied with the electricity works it would be economically to the advantage of the town. This brought Mr. Roberts, Borough Engineer and Surveyor into the discussions but the idea of the refuse destructor was not pursued further.

Decisions of the Electricity Committee were affected by the fact that a high proportion of the streets were already lit by gas lamps, mostly with the old 'bats wing' type of burner; also, although the Council, via its Gas

Committee, had the right to give or refuse permission to erect lamp standards those in the streets were actually owned by the Gas Co.

At the beginning of January, 1899 the Electricity Committee asked the Gas Committee for an estimate of the cost of converting to incandescent (Welsbach) burners all the gas lamps throughout the Borough and to state the candle power of these new burners. They also asked the Consultants for the estimated cost of converting all the existing gas burners to electricity and laying the necessary distribution mains. The result of these enquiries showed that it would be economically sound to light the whole town by electricity. (It may be noted that an 8 candle-power (c.p.) lamp would demand approximately 30 watts (W), a 50 c.p. lamp 188 W and a 500 c.p. arc lamp about 2000 W).

The arrangement finally agreed with the Consultants comprised arc lamps of 1000 c.p. along Marine Parade, up South Street and Chapel Road from the pier to the railway station and in Warwick Street, Montague Street and Rowlands Road; standards bearing one 50 c.p. lamp were to be used in a few streets while all remaining standards were to employ two 8 c.p. lamps.

The Consultants were able to plan for 49 1000 c.p. lamps and 5000 8 c.p. incandescent lamps for £24 000, the revised figure given by Professor Kennedy but suggested that for an extra £6500 the number of 8 c.p. lamps could be increased to 10 000; they also suggested extending the 'compulsory' streets by three miles at a cost of an extra £3000 plus a still further suggestion costing £3500 that the conduits for carrying the street lighting cables should be designed to carry additional cables for private consumers. A total cost figure embodying some of these suggestions was finally agreed at £36 900.

The final scheme prepared by the Consultants and approved by the Council was based on a 3-wire d.c. system instead of the 2000 V a.c. system suggested by Professor Kennedy. A 'balancer', frequently referred to in the documents as a 'booster', was to be used to maintain approximately equal voltages on the two supply halves of the 3-wire system.

In May 1899, and after much discussion, the scheme was submitted to the Board of Trade for approval and to the Local Government Board for a loan of £36 900, the latter to be repaid within 50 years for the building costs and in 30 years for the installation costs; repayment was to begin after 5 years. Board of Trade approval was obtained without difficulty but the Local Government Board queried some items, particularly the drainage at the Generating Station and final approval of the loan was not obtained until 20th November, 1899 and then only for £32 500. The Consultants were therefore instructed to cut back their estimate to the above figure and to prepare working plans and invite tenders.

In June 1900 Councillor Ovenden and the Borough Engineer went to London to look at lamp standards and agreed upon an 'Edinburgh' design; this choice has stood the test of time and some of these standards still support lamps around the town and particularly in South Street, Chapel Road (Fig.9) and along the Promenade.

During September numerous tenders were coming in, 27 quotations covering 67 alternatives being submitted for the generating plant alone. At their meeting on 25th September the Council in Committee authorised the Electricity Committee to proceed with plans for the building of the Generating Station under the supervision of the Borough Engineer. The first official of the

Fig.8
Mr Frank Roberts
Borough Surveyor

Fig.10
Mr Geoffrey Porter
Borough Electrical Engineer

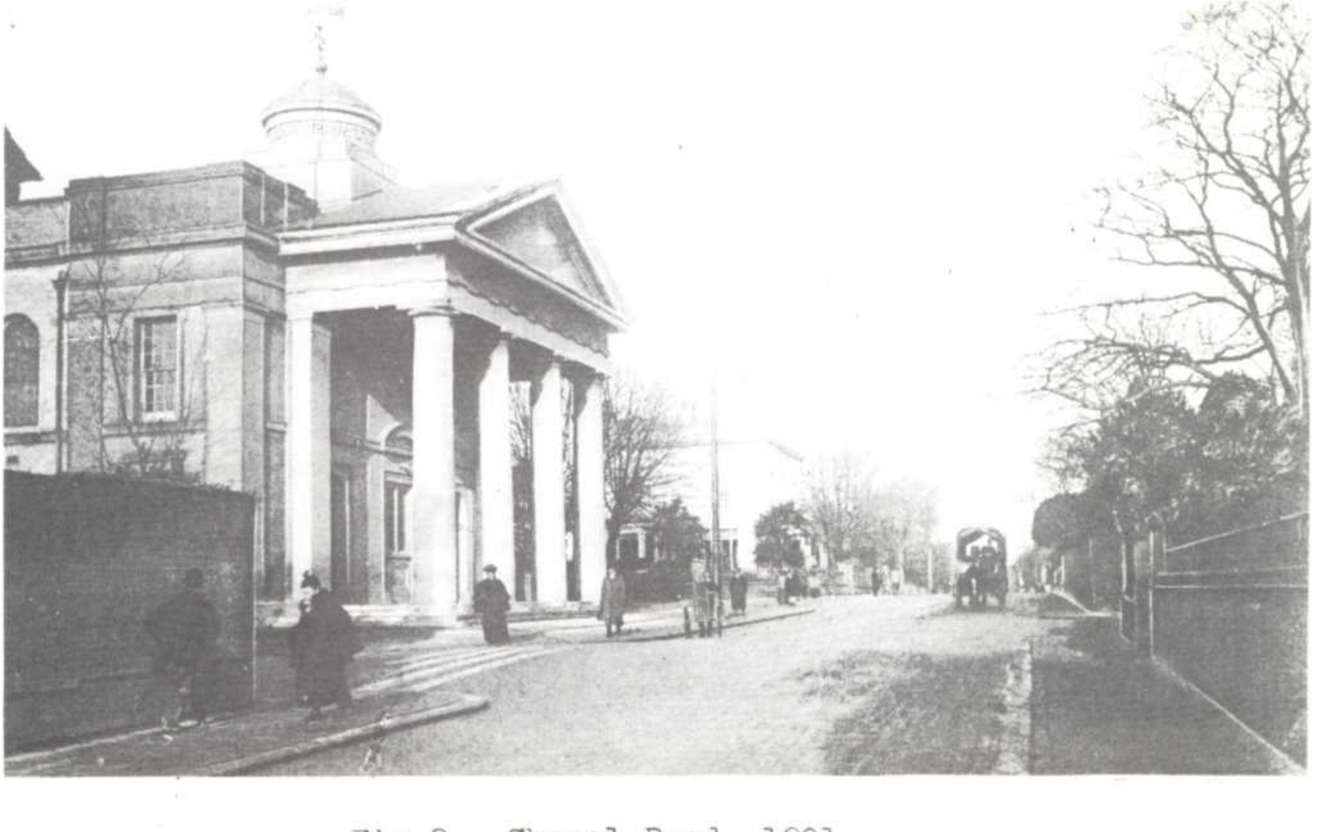


Fig 9 Chapel Road, 1901
from outside present Seeboard Office

Electricity Undertaking was appointed, Mr. William 'Conky' Davidson who became General Works Foreman at a wage of £3.10s. per week; his first task was to receive the building materials at the site, including 160 000 bricks.

An advertisement had also been published for a Resident Engineer at a salary of £250 per year and by 29th October 106 applications had been received. The Consultants reduced this number to 3 from whom the Electricity Committee finally selected Mr. G. Porter (Fig.10) of the Westminster Electric Supply Corporation. Mr. Porter built up a very successful Undertaking and remained as Borough Electrical Engineer from the day of his appointment, 10th January, 1901 until he died in 1935.

Much discussion with contractors about the laying of cables and the wiring of individual premises took place during the early part of 1901 and in March a pamphlet containing details of the scheme was circulated; a Public Lecture was also given by Mr. Monkhouse (of B. & M.) at the Theatre Royal. As forecast demands requiring extension of the distribution mains were rapidly coming in and it became necessary to appoint an Assistant Engineer; in August Mr. A. C. Seaton from the Dewsbury Electric Station was appointed at a salary of £100 per year.

By 9th September test runs on the generators were completed satisfactorily with only a few minor difficulties. There was, however, much indignation by residents in the vicinity of the station on account of excessive noise and vibration; everyone was assured, however, that this was only temporary, being due to the steam engines having to be exhausted to atmosphere instead of through the condensers, these not yet being ready. Also two blowers had to be added to increase the draught to the boilers, but by 21st September all was in order for the Official Opening Ceremony.

The cost of electricity to the general public was fixed at 5d., 4½d or 4d. per unit (kWh) depending on the amount used. There was also a 'free' wiring scheme whereby householders could have their premises wired without immediate cost to themselves but would have to pay for a specified period, an extra ½d per unit for their electricity.

The Opening Day - 21st September, 1901

The formal Opening Ceremony was performed at the Generating Station by the Marquis of Abergavenny, K.G., Lord Lieutenant of Sussex who arrived at Worthing station at noon and was met by Councillor F. E. Ovenden, J.P., who was now Mayor, and Councillor J. Raffety, Chairman of the Electricity Committee. A pair-horse carriage took the party to the Generating Station where they were met by the Town Council in full Civic Regalia. Having assembled within the building the Mayor called upon the Rev. Fellowes, Rector of Heene to recite a Collect and offer a prayer. In asking the Marquis formally to open the Station the Mayor expressed his appreciation of the extremely effective and expeditious way in which the work of setting up the Undertaking had been carried out, credit being due primarily to the Consultants, Messrs. Burstall & Monkhouse, to Mr. Peach the Architect and to Mr. Roberts, the Borough Surveyor who had supervised the work in place of a contractor. The Marquis then came down from the platform and, under the direction of Mr. Monkhouse and Mr. Porter, the Borough Electrical Engineer, turned a wheel that set in motion one of the two dynamos. The applause of the company proclaimed that the Generating Station was now in practical operation. The Marquis then expressed his pleasure at having been invited to perform the Opening Ceremony and praised the Mayor and Corporation for the trouble and interest they had taken in fostering the scheme and wished it every success.

The Ceremony was followed by a very sumptuous Luncheon in the Town Hall at which were present the entire Corporation, Council Officers and many important Worthing Citizens as well as numerous guests from neighbouring Boroughs. Owing to another engagement the Marquis had to leave before the assembled company had worked through a long Toast List in which the health of many who had been associated with the Scheme was drunk and appropriate replies made.

The general public showed only a limited interest in the above ceremonies but turned out in force in the evening when the Mayoress switched on the lights. No expression of approbation of the work of the Corporation had ever been so great as that expressed on this auspicious occasion.

The above article has been abstracted from an Academic Thesis submitted by the Author, Mrs. M. L. Morris. Although Mrs. Morris has co-operated fully in the preparation of the abstract, the Editor accepts responsibility for any errors or omissions that may have arisen in the process.

FIELD PROJECTS

Coultershaw Bridge Water Pump (SU 972194)

The restoration of this water-wheel-driven pump, originally built in 1782 to augment the water supply to the Egremont family at Petworth House, has now been completed and, on occasion, can supply a fountain near the road-side. It was ceremoniously restarted before an appreciative audience by the present Lord Egremont on 4th July, 1980. Work still continues at the site, however, on the erection of the 100-year-old barn presented by Lord March which will eventually become a Museum and Information Centre for the Rother Valley. Details of the pump were described in Sussex Industrial History No. 9, 1979.

Piddinghoe Kiln (TQ 432033)

The Society, in association with the Lewes Archaeology Group, is rebuilding this updraught bottle kiln which had fallen into serious disrepair. The work has involved carefully measuring and photographing the structure prior to rebuilding it brick by brick. The kiln, originally built about 1800, is the last remaining example of its type in the South East and was last fired in 1901. It is hoped to publish a detailed account of the work in the next issue of Sussex Industrial History.

Burton Mill (SU 980180)

The mill is now grinding for sale to the public although the owner is still working on certain details.

Clayton Mills - Jack and Jill (TQ 204134)

The main structural timbers of Jill have been replaced and work is proceeding on the cladding and on the fantail. Details of the mill were described in Sussex Industrial History No. 10, 1980. Of the £25 000 needed for the restoration, £18 000 has already been raised by the Jack and Jill Preservation Society.

The Brick Survey

Much active work has been done including the above-mentioned restoration of the Piddinghoe kiln. A survey of Mathematical tiles throughout Sussex has amassed details of over 300 buildings, over 50 being in Lewes, that embody these tiles but no evidence has been found to indicate where they were made. Work has also continued in the Brighton area on locating and documenting the brickworks which supplied early building materials for the town.

Remains of brickworks in many areas throughout the County have been surveyed and recorded and an attempt is being made to compile a bibliography of Sussex brickmaking.

Chalk Pits Museum, Amberley

The Museum will open for the 1981 season on 12th April. The layout has been significantly changed in order to increase the size and attractiveness of the displays.

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