Industrial Archaeology Notes 1979

Compiled by Malcolm G. Knapp

GRANTHAM Dysart Road Railway Bridge
(Grid reference SK 908357)
Malcolm G. Knapp

Plate I Dysart Road Bridge, Grantham, looking west towards Earles fields. Malcolm G. Knapp.

Plate II Dysart Road Bridge, Grantham, looking west towards Earles fields. Malcolm G. Knapp.

Grantham’s first railway, the line from Nottingham, opened on 15 July 1850. The company, named the Ambergate, Nottingham, Boston and Eastern Junction, located their station near to the wharf and basin of the Grantham-Nottingham canal. To reach that area two bridges had to be built over existing roadways, and in September 1979, one of these bridges, the one over the busy Dysart Road, was demolished. It had suffered several times in recent years being damaged by heavy lorries and even double-decker buses. This was usually caused by it only having 13 ft. 3 in. headroom. It had been left for some years with only one track across it. During its later years it was owned by Messrs. John Lee to enable them to carry scrap and steel to their private sidings at the Old Wharf.

The bridge was built of blue brick with separate passage ways for vehicular traffic and pedestrians, and during the 1939-45 War blast walls were constructed at either end of the pedestrian way.

Plate III Dysart Road Bridge, Grantham, showing bridge after last collision with heavy lorry, looking east towards town centre (Westgate). Malcolm G. Knapp.

Plate IV Dysart Road Bridge, Grantham. The pedestrian walkway. Malcolm G. Knapp.

GRIMSBY DOCKS Towers and Hydraulic Installations
(Grid reference of Dock Tower TA 278113)
H. S. Waddington

The most spectacular feature of Grimsby Docks is the well known red brick Dock Tower, the tallest brick or stone structure in erstwhile Lincolnshire. Nearby is a smaller and later brick tower, much less noticed. Both were built as parts of hydraulic power installations for operating dock machinery. The Dock Tower is listed as grade 2 starred and the other tower as grade 2 as it ‘forms a visual group with the Dock Tower and is included’ (as a listed building) ‘for this reason’. Besides being of visual interest,
cranes and hoists had obtained their power from town supply reservoirs but this was not satisfactory. It was realised that a separate and special supply of water under pressure was needed for each installation and several different types came under development, as will be discussed later. The main purpose of a hydraulic system in places such as docks was to convey power from a central point by distributing water under pressure through pipes, mainly underground, to appliances around the dock estate which were operated by the water. Appliances such as lock gates, sluices and cargo cranes and hoists are in use only intermittently thus causing a widely fluctuating demand for power from the central supply point. A reservoir of water under pressure is required from which large demands over short periods can be met and which is replenished when few appliances are working. The towers at Grimsby were built to accommodate two different ways of providing a reservoir.

The Dock Tower was built in 1851 as part of the original Royal Dock installation to operate lock gates (the first such machinery designed by Armstrong), sluices and cranes. It is 303 ft high and tapers from 28 ft square at the ground to 26 ft square at 200 ft above ground at the main machicolation, beyond which is a smaller tower, Lantern and spire. It was designed by J. W. Wild after the style of the medieval tower of Siena Town Hall. The bricks were made on site from clay obtained from the adjoining marsh. The purpose of the tower was to support a water tank, open to atmospheric pressure, high enough to produce a static pressure sufficient to operate the appliances at ground level and big enough to cope with the fluctuating demand without the risk of its being completely emptied. The bottom of the 33,000 gallons capacity tank is 214 ft above ground, producing a pressure in the water of about 90 lb/sq in at the appliances. A vertical cast iron pipe 18 in. dia. inside the tower led the water from the tank into the distribution mains. The tank was fed by two 10 in force pumps worked by a duplicate horizontal engine of 25 hp taking water from bores into the underlying chalk.

A disadvantage of this simple system was its limited pressure necessitating large and expensive operating machinery and mains. For instance to work the gates of the 70 ft wide lock two double-acting cylinders 3 ft dia. and 18 ft stroke, were required. The developments mentioned earlier, which were being pursued at about the same time as the Dock Tower was being built, included designs using higher working pressures, say 600 lb/sq in, thus permitting the equipment to be more compact (though more robust) and cheaper. To obtain this pressure would have meant having tanks at the impracticable height of almost 1500 ft. Instead, pumps working at the required pressure were connected directly to the distribution mains. A device for cushioning and to act as a reservoir was needed. A system using an air vessel was tried but was unsatisfactory. A device incorporating a weighted ram and a cylinder was introduced and came into widespread use, known as an ‘accumulator’ presumably because it accumulated water under pressure when pumping output exceeded demand and released it when demand rose. The high pressure system with accumulators came quickly into use, as for instance at New Holland Dock (c. 1850), at Grimsby Old Dock (now absorbed in Alexandra Dock) soon afterwards and at Birkenhead Docks in 1851.

The low pressure system at Grimsby Royal Dock remained in operation until 1892, when it was replaced by an installation working at 900 lb/sq in and it was then that the small brick tower, 78 ft high and 18 ft 6 ins square, was built to house the necessary accumulator. This consists of a vertical cast iron cylinder (set on a foundation at ground level) through a gland in the top of which a 24 in diameter
ram can slide up and down with a maximum stroke of 24 ft. An annular tank loaded with scrap iron, etc., is suspended from the top of the ram and moves up and down with it completely encompassing (but not touching) the cylinder when the ram is right down. Rails on the inside of the tower guide the tank and keep its movement truly vertical. A single pipe connects the cylinder to the mains. When the pumps are over-running the demand, the excess water is forced into the cylinder thus lifting the ram and its weighted tank; when the demand exceeds the pump output, the ram descends under its own weight and that of the tank thus forcing water back into the mains. The weighting of the tank is arranged so that the water pressure is just balanced. As the ram nears the top of its travel it trips a lever which stops the pumps, and there is a similar trip lever towards the bottom of the travel which restarts them. The nearby pumping station was originally steam driven but electrically driven pumps were installed later which, like the accumulator, are at the time of writing still in use for working the gates and sluices at the lock entrances.

Conversion to electrically driven oil-hydraulic operation with local units at each gate and sluice is now in hand and the 1892 hydraulic installation will be pensioned off. The British Transport Docks Board, the owners of Grimsby Docks, applied in December 1978 for listed building consent to demolish the hydraulic accumulator tower as it would fulfill no useful purpose once the new equipment was in operation. When this application was published in the local press the department of the Director of Development of the Great Grimsby Borough Council received a vast number of protests, mostly from people with the mistaken idea that the Dock Tower itself was threatened. (In fact, the Docks Board undertook extensive repairs to the Dock Tower in 1979.) The representations by those who realised that the subject was the smaller hydraulic accumulator tower must have helped to persuade the Borough Council to refuse consent in April 1979.

So Grimsby Docks provide examples — elevated tank, hydraulic accumulator and local oil-hydraulic equipment — which illustrate three types of installations covering 150 years of development, most probably an exceptional display in one location.

In the sequence of hydraulic power developments, as described earlier, the elevated tank system came between the use of town reservoirs which held sway until 1849 and the adoption of high pressures incorporating accumulators in about 1850-51. In that very short transition period the Grimsby elevated tank installation came into being and must therefore be a rare example. The writer would be interested to hear if any other similar elevated tank installations are known and if any traces remain.

Acknowledgement
Much of the foregoing information was obtained from the British Transport Docks Board, Dock Office, Grimsby, to whom the writer’s thanks are due.

FOOTNOTES
5 Clarke, op. cit., p. 51.

LINCOLN Street Furniture of Motherby Hill (Grid reference SK 974-717)

Catherine M. Wilson

Motherby Hill is a little-known footpath running steeply down the limestone escarpment from the top of Spring Hill to West Parade. For most of its length it lies on top of the western wall of the Lower Roman Colonia, parts of which were exposed during the building of the Lincoln Police Headquarters in 1971. The footpath now known as The Park continues south from West Parade, still following the line of the Roman Wall and emerges on Newland opposite Lucy Tower Street. Although it is now broken by City Hall which was built across it in 1970-72, this footpath still provides a quick short cut downhill for the energetic. Its interest to industrial archaeologists, however, lies in the variety of its cast iron street furniture which represents no less than six of Lincoln’s foundries. The street furniture falls into three main categories which will be dealt with in turn.
angle to accommodate the hill slope the hole runs at approximately 30° to the horizontal. There are minor variations within this type as twenty-two are cast with the name PORTER & CO., whilst a further twenty-two bear the words PORTER & CO. LINCOLN, though in all other respects they are identical. The remaining two in this type lack the second collar on the shaft (Plate IX). One bears the name W. RAINFORTH & SONS, LINCOLN and the other has DUCKERING LINCOLN cast in an oval near the top.

**Type 2**

Ten stanchions on Motherby Hill are of type 2 but the same pattern can be seen on Spring Hill; on an alleyway leading west from Motherby Hill and at the bottom of The Park, near Newland. This type has a square faceted head through which the hand rail passes, again at an angle. The two remaining flat faces and the top are decorated with a circle and diamond (Plate X). The cylindrical column has a collar at the base. Of type 2 all but three bear the name DUCKERING LINCOLN. Two bear no name at all and the third (which lies at a distance from the others on The Park) has W. RAINFORTH & SONS LINCOLN cast on it.

**Gas Lamps**

Motherby Hill retains its gas lamps and there are four between Spring Hill and West Parade. Starting at the top, the first (Plate XI) has no name but is almost certainly by Wm. Foster & Company. It has a rectangular base, with a flower and leaf design on all four sides, a reeded column and a foliate cross arm below the lamp itself.

The second has the same base and column but has no cross arm. Two sides of the base are cast with the same flower and leaf design but the other two sides give the origin of this particular lamp. They bear a silhouette
portrait resembling the Duke of Wellington and the words W FOSTER WELLINGTON 1868 FOUNDRY LINCOLN (Plate XII). The third gas lamp is of a different type. It has a fluted column on a round base, and a cross arm bearing the words CITY OF LINCOLN and the city coat of arms (Plate XIII). On the base is cast (M)

PEARSON LINCOLN. The fourth lamp is identical to the third except that it carries the name PENNEY & CO LINCOLN round the base.

Drain Covers
There are four of these all circular and of standard design. They bear the name DUCKERING LINCOLN (Plate XIV). One non-local piece of cast ironware has crept in — the universal manhole cover by Needham of Stockport.

The date (or dates) at which these various items were installed on Motherby Hill is not known, though it is likely that they date from the first decade of the 20th century. The fact that different firms have apparently used the same patterns for casting (with the exception of their own name) suggests either that the patterns were the property of the Corporation, or that there was a great deal of interchange between the firms. The survival of these items representing six different Lincoln firms in such a short distance is most unusual and it is pleasing that the City Council seem to have every intention of retaining them instead of replacing them with plastic and concrete as is happening elsewhere.

Some brief notes on the firms represented may be of interest.

Duckering
This firm was established in 1845 by Richard Duckering, iron and brass founder, on Waterside North. By 1877 it was being run by Charles Duckering who was described as a
machinists, and wireworkers, in 1867 but by 1881 had added ‘agricultural implement makers’ to their description. In 1894 their premises were named the City Iron and Wire Works but were still on the original Mittens site in Broadgate.

Porter
John Porter set up his business between 1856 and 1861 near Gows Bridge. By 1867 the firm was known as JTB Porter and Company, Engineers and Contractors for Gas Works. From their entries in directories it would seem that equipment for the gas industry was their major concern but an advertisement in 1894 describes them as ‘Manufacturers of all kinds of gas apparatus, also cast and wrought iron girders, tanks, roofs, columns, etc.’ In 1910 the goodwill of the firm was assigned to Penney and Porter. They are recorded as producing semi-diesel engines in the 1920s but their main products must have remained the smaller items of cast iron ware. On the agricultural side they are best known for their seed cleaning machinery, of which an example survives in Heckington windmill.

Rainforth
William Rainforth was in business by 1867 as a wireworker, weaver and machinist in Swanpool Court. He was also involved in producing waterproof covers, rope and sacks at the Stamp End Cover Works. In 1871 he took over a foundry previously occupied by Michael Peniston and then by Clarke Bros. and Odlings in St. Rumbold Street. By 1877 the business was known as William Rainforth and Son, and they were described as agricultural implement makers, brass and iron founders, wireworkers, weavers, machinists, etc. They retained the rope works at Stamp End and the manufacture of waterproof covers but added ‘coal and salt merchants’ to their achievements. To judge by the directory entries the firm grew rapidly and by 1894 claimed to have the largest agricultural showrooms in the kingdom which ‘will be found replete with a large stock of agricultural implements and machines by all the leading makers’. In 1899 they were advertising ‘Rainforth’ cycles in addition to all their other wares but their most appropriate product must remain the rain water gullies which still traverse so many of Lincoln’s pavements.

I am indebted to Mr. Chris. Johnson for some of the above information. The rest has been culled from a quick search of the Lincoln trade directories and is by no means comprehensive. Each of these firms deserves a much more careful study than I have been able to give.

MESSINGHAM MILL
(Grid reference SE 879060)
C. Page and M. J. Upton

Introduction
This old water mill forms part of the buildings at Watermill Farm just over one mile north-west of Messingham village. The mill is a three storeyed building positioned near Bottesford Beck on an east-west line and constructed of brick and sandstone with a pantile roof. Its external dimensions are 46 ft long, 25 ft wide and 30 ft high to the roof of apex at the east gable. A plaque built in the wall near the latter point bears the date 1818.

The mill was used for grinding corn and was initially water powered. It was converted to steam operation in 1836 although water power could also be utilised when available, but it is doubtful whether water and steam power could be used simultaneously. The mill last worked about 1910.
Provision of Water Power
Two cuts leading from Bottesford Beck two or three hundred yards away to the east can still be traced. There are clear remains of a substantial mill pond, a dam wall and guillotine-type sluice gate. The water wheel was placed at the north-east corner of the mill and, judging by the width of the mill race and the circular scraped marks on the mill wall, measured approximately 9 ft 6 in wide and had a diameter of 12 ft 10 in.

Important points of information arose during a visit made to Mr. V. Clay of Bottesford Moors Cottage on 18 October 1970. Mr. Clay was then 87 and had lived there for 70 years. He stated that the mill wheel was originally under-shot but was later changed to an iron breast wheel with buckets, necessitating the mill pond, dam and sluice. A useful piece of evidence was a water colour painting Mr. Clay himself did of the mill over fifty years earlier. This shows the water wheel enclosed within a housing with a ridge roof springing from the mill building's north wall. It was also clear that a brick wall had been built over the race at the entrance to the wheel as part of the housing.

Mr. Clay mentioned that an iron grating was placed by the entry sluice to the water wheel. At one time he thought the sluice had been made of leather. The iron wheel was sold as scrap to a Sheffield dealer, a point later supported by Mr. Swaby of Watermill Farm who said a former occupier of his farm disposed of the mill's machinery about 1940, possibly as part of the war effort.

Mr. Clay recalled that the mill pond provided excellent fishing many years ago. He remembered also corn being cut, threshed, ground and the cakes baked with the flour all on the same day.
Excavation of Water Wheel Pit
In October 1970 members of the Lincolnshire Industrial Archaeology Group excavated the water wheel pit and uncovered the gearing foundation within the mill in line with the water wheel’s axle.


Provision of Steam Power
At the west end of the building on the ground floor an engine house had been constructed in 1836. This date appears above the opening in the engine house wall through which came the main driving shaft from the engine’s flywheel. The engine house internal dimensions are 17 ft 8 in long, 8 ft 11 in wide and about 16 ft high.


Nothing remains of the original machinery. Large masonry engine beds suggest a substantial engine but despite many enquiries little information has been found concerning its type and manufacturer. The major piece of evidence obtained originates again from Mr. Clay who remembers seeing the engine in operation. He was unable to describe the engine in detail but was definite on one point — the engine had a moving beam. He was also sure that the boiler was situated outside near the chimney and was not roofed over.

The chimney was built just 7 ft away from the west end of the mill building. It is 4 ft 8 in square at the base tapering to 3 ft square at the top which was estimated to be 57 ft high. It is built of brick and while having a distinct lean to the north and disintegrating at the top, it is in reasonably good condition.

The engine house must once have been an attractive sight. The walls were plastered. A well proportioned window was set high in the north wall. The engine’s flywheel, again judging by the marks made on the wall against which it turned, measured 5 ft 5 in in radius. It was in fact too large to be entirely contained within the engine house and an opening in the wall had to be cut to allow it to rotate freely. However the wheel protruded only a few inches.

It is assumed that the drive from the steam engine operated the same mill gearing and machinery as the water wheel. It is almost certain that steam power was installed because water power was only intermittently available, depending as it did on a sufficient head of water in the mill pond.

The Mill Building
The present fabric is generally good although the second floor is rotting and there are holes in the roof.

In the interior north wall about half way between the engine house wall and the point where the water wheel’s axle entered the mill is a stone wall plaque with an inscription. Parts have flaked away but as a result of investigating old directories and by guesswork it is believed the wording runs thus

MARSH & MARSH
STONE MASON
PENISTONE YORKSHIRE


Mr. Clay believed that the 1818 mill was not the original mill in the vicinity. He had been told in his youth that an earlier mill had existed, built astride the Bottesford Beck close to the present mill’s situation and was both a wind and water mill. This could well have been similar to the Hibalstow mill which operated by both methods.

Ownership
From directories it has been possible to piece together some background to the ownership of the mill. The earliest record found is of Parker and Newburn operating as corn millers in 1842.

Thereafter the history runs 1849 Thomas Parker 1855 William Giles Coates 1856 Edward Giles Coates 1872 Edward Giles Coates 1876 John Spilman 1885 James Spilman (This entry actually specified milling by both steam and water) 1906 James Spilman 1909 George Scott 1913 No miller mentioned. George Scott was recorded as a farmer only.

It can be assumed, therefore, that the mill ceased to operate at some time between 1909 and 1913 and Mr. Clay’s own version of 1910 as the closure date cannot be far wrong.