Industrial Archaeology Notes 1986-1987

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A RUSTON & HORNSBY SHALE PLANER

John Turner

On the evening of 3 July 1986, a large group assembled at the Kings Dyke works of The London Brick Company Limited, located at Whittlesey to the east of Peterborough, the main purpose of the site visit being to watch their Ruston and Hornsby shale planer in action. The present brick making complex at Kings Dyke was built on the floor of the worked out clay pit and was begun in 1968. It is some eighty feet below ground level, and it is at this level that the shale planer operates. This site means that most of the site is hidden from view while the broken clay shale excavated by the shale planer is transported by conveyors with only a twenty feet difference in height between the shale planer loading point and the final discharge point located about one hundred yards away.

Only five shale planers were ever built by Ruston and Hornsby Limited at their Lincoln works, being constructed from 1924 to 1930, and all of them were intended to work in clay pits in the Whittlesey area. Of these five the two largest examples, both designated SP90, are still working today some sixty years later. The one at Kings Dyke, serial number 1123, was delivered to Messrs. Itter Limited, Whittlesey, in the October of 1926. A model type SP90 it is designed to cut a face 88 feet in height, although today it actually cuts a 70 foot face, (Figs. 1 & 2). The other remaining SP90, serial number 1122, is, we were told, still operating in the Saxon works of the London Brick Company, located just to the south of the Kings Dyke works.

Due to the very deep seams of clay shale which are peculiar to the Peterborough area the old style method of excavating the shale by manual labour, working in terraces down the quarry face, was costly, arduous and very dangerous, particularly in wet conditions. It was to alleviate these problems that the shale planer was designed. The design is said to have been based upon a machine seen by Ruston and Hornsby's chief engineer, Mr. William Savage, while in America, although the exact nature of the machine that he saw is not known. However the concept is similar to that employed on the scraping excavators being built at the same period by the German manufacturers Messers. Lubecker Maschinenbau-Gesellschaft at their Lubeck works, which were designed to excavate the deep seams of brown coal found in the Rhineberg region of Germany.

The description which follows is based upon the design parameters of the machine when supplied in 1926. It has remained basically unchanged since that time, although some minor changes have taken place to suit modern requirements of safety and comfort. The shale planer has a tall lattice super structure which houses all of the excavating mechanism and slides on a normally static truck frame. The truck frame is fitted with four sets of four bogie wheels and capable of being propelled sideways along short lengths of rail placed in its path.
The basic principle upon which the machine works is that a series of single hardened steel teeth attached to a continuous chain travel downwards down the working face, each in turn, due to the slewing action of the superstructure, starting a fresh cut into the face of the shale. This action produces a constant mix of the various strata of clay as well as breaking up the shale into workable size pieces. The depth of cut is only of the order of 3/8 inch, thus when the machine has slewed once across the working face the whole superstructure must be racked forward a further 3/8 inch, the slewing action reversed, and then the cut made in the opposite direction. When the superstructure has been racked out to its furthest limit it is racked back and the whole machine moved sideways, parallel to the working face, on rails placed in its path, so that a fresh entry into the face may be made. Each tooth is preceded by a scraper plate and followed by another scraper plate. The forward one collects the broken shale from the cutting action of the tooth and deposits this spoil at the base of the machine, while the rear scraper plate picks up the spoil thus deposited and pushes it up a steel chute and into a hopper located in the centre of the truck frame from where it drops onto a conveyor system and hence via a modern 26 inch wide covered conveyor system it is transported to the brick making plant.

The basic shale planer movements are achieved by means of three three-phase electric motors, the original specification for which was: one, a 70 H.P. motor to drive the continuous chain, which carries the cutting teeth, at a speed of 140 feet per minute; two, a 10 H.P. motor which operates either the slewing or propelling movements - the machine may be propelled at a speed of 6 feet per minute or would take half an hour to slew through a complete circle; three, a 3 3/4 H.P. motor for racking the superstructure in or out of the face - forward at the rate of 2 inches per minute and backward at the rate of 18 inches per minute. The superstructure snailed on and is supported by a ring of forty-eight 10 inch diameter double flanged rollers which run between two 20 feet 4 inch diameter rails, one attached to the superstructure and the other to the truck frame. As the superstructure may be racked back and forth, it, too, runs on rollers which are attached to the same framework as the upper slewing roller rail.

The actual performance of the machine while operating has changed little, if at all, over the years. The working face of the shale is cut to a batter of 1 in 2.94 and, by a combination of the machine's cutting action and operator skill, the working face presents a very flat and regular appearance with the individual grooves cut by the teeth clearly visible. This neat and efficient method of excavating the shale has meant that it is planned to continue working at the Kings Dyke site using this shale planer for at least another fifty years, a tribute to the original designers and manufacturer.

BOSTON - TUXFORD IRONWORK AT BLACK SLUICE

Neil R. Wright

On 5 April 1987 members of the SLHA surveyed a large iron structure at the Black Sluice in Boston (TF 327428). The survey was carried out because the Anglian Water Authority was about to remove the old iron structure so that modern automated machinery could be installed.

The Black Sluice stands at the end of the South Forty Foot Drain, where that man-made drainage canal enters the tidal Haven, and it serves to keep out the tide and
maintain the water level in the drain. A bridge over the sluice carries London Road, the main road into Boston from the south. The original sluice and part of the drain were built about 1635-1638 but were largely destroyed by local opponents of the drainage scheme. Not until an Act of 1765 was the Black Sluice rebuilt and the South Forty Foot Drain extended to its present length of twenty one miles to Bourne.

In the 1760s and 1770s many of the fens in the Black Sluice district were enclosed and brought into cultivation. In 1770 an Act of Parliament recognised that the South Forty Foot and certain linked drains could be used for navigation and fixed the tolls to be charged. Plans of the Black Sluice in 1852 and 1860 (Fig. 3) indicate that there was a navigation lock next to the northernmost of the three openings in the 1765 sluice so that boats could pass in and out of the Haven. There was a wharf on the north bank next to the Black Sluice and by 1826 there was a regular market day packet boat between Boston and Billingborough. Packets also went to Donington, Helpringham and to Claydike and Maryland in Holland Fen, and some of these services continued until 1889 at least.

The third and present Black Sluice was built under an Act of 1846 as part of a scheme drawn up by Mr W. (later Sir William) Cubitt (1785-1861). At the time Cubitt was also consulting engineer to the proposed Great Northern Railway which would pass through Boston. The new sluice was built to the south of the 1765 sluice, and the drain had to be widened at its eastern end. The turnpike tollhouse on the London Road also had to be moved to a new position just north of the earlier sluice, and the adjacent House of Correction also had to be rebuilt. The new tollkeeper’s house was built on the east side of the road, backing onto the Haven, and a small weighing house was built facing it on the opposite side of the road.

The 1846 sluice, which was still under construction in 1848, had three openings each twenty feet wide and the cill or floor of the openings was six feet lower than that of the 1765 sluice. The two southern openings were sluiceways with timber pointing doors on the tidal side. To the west of the bridge were guillotine gates on each of those openings with a wooden superstructure to raise and lower them. The third opening was a navigation lock with two pairs of gates facing inland and one pair of sea doors so the lock could not be used when the water in the Haven was higher than in the drain. The old sluice was bricked up after the new one was completed and sit soon built up on its river side. Nearly a century later the Black Sluice Pumping Station, which came into operation in 1946, was built to the west of the 1765 sluice and when necessary pumped water out through the site of that sluice. In 1966 an extension was added to the south of the Pumping Station, over the site of the 1846 lock.

The two sluiceway openings of 1846 still remain in their original use, and the iron structure surveyed stood over them on stone piers extending west of the road bridge. (Figs. 4-6). The main purpose of the iron structure was to support capstans which could raise and lower guillotine type gates to maintain the water level in the drain. At the top of the structure was a platform with four capstans, one at each end of each gate. Iron chains going over the capstans supported the gates on one side and counterweights of metal rings on the other, so there was comparatively little effort needed to turn the capstan and raise or lower the gate because the weight on each side was about equal. The machinery of each gate was operated by attaching a handle and turning a wheel which was geared to one of the main wheels carrying the gate; a long axle transferred the same movement to the other capstan of that gate.

Fig. 4 Black Sluice, Boston, overall view (Mrs. C. M. Wilson).

Fig. 5 Black Sluice, Boston (Mrs. C. M. Wilson).

A cast iron plate on one of the capstans bears the legend:

R.G.M. STONEY’S/PATENT SLUICE/RANSOMES & RAPIER LTD/LONDON & IPSWICH.

This suggests that the capstans and their related chains and the original gates were produced by Ransomes and Rapier Ltd. However the large members of the supporting frame have the words ‘TUXFORD & SONS’ and ‘BOSTON’ cast into them. The floor at the top of the structure consists of perforated cast iron plates and at least one of them is also inscribed ‘TUXFORD & SONS BOSTON’.

The engineering firm of Tuxford & Sons started in 1826 and their Boston and Skirbeck Ironworks closed down in 1887 but it was an innovative firm and experimented with many ideas and designs during its comparatively short existence. The works were not far from the Black Sluice, on the other side of the Haven a few hundred yards downstream, but the safest way to deliver the ironwork was probably by road through the town centre. An examination of the records of the Black Sluice Commissioners indicated that William Tuxford had carried out a special repair to the sluice in 1870. It involved the replacement of Cubitt’s decayed timber structure, then just over twenty years old, by the iron structure which remained in use until 1987. The work was completed by February 1871 at a cost of £388, of which £374 was on the renewal of the ironwork. A number of steam engines and other machines made by Tuxford’s have been preserved and restored by enthusiasts, but when this ironwork was dismantled it was probably the largest Tuxford product still being used for its original purpose.

The old lifting gear and all the associated Victorian ironwork was removed later in 1987 by the Anglian Water Authority and modern electrically operated machinery
The interesting feature is that the coping stones are old railway sleeper blocks dating from the earliest days of railways. Each stone is, very roughly, two feet square and 10½" thick and has two holes nearly two inches in diameter and about six inches apart for receiving the fastenings for the rail. The stones on the sloping end have been worn smooth by countless children sliding down it.

Fig. 7 Barnetby Railway Station yard, small retaining wall with cope of stone sleeper blocks, November 1987, (H. S. Waddington).

Fig. 8 Barnetby Railway Station Yard, Old stone railway sleeper blocks re-used c.1915 as coping-stones on small retaining wall, (H. S. Waddington, measured 8.11.1987).

OBSELETE STONE SLEEPER BLOCKS REUSED AT BARNETBY.

H. S. Waddington

The original Barnetby railway station of 1848 was completely rebuilt in 1915 when the line from Wrawby Junction to Brocklesby was quadrupled to cope with the additional traffic produced by the opening of Immingham Dock three years previously. It is highly probable that a small blue brick retaining wall in the yard on the north side of the station was part of that reconstruction. (Figs. 7 & 8)

From a building it projects 8'-10" with a height of 2'-9", then for a further 4'-8" slopes down to ground level, giving a total length of 13'-6".

FIG. 6 Black Sluice, Boston, gates and supports (Mrs. C. M. Wilson).

installed in its place. The ironwork by Tuxford & Sons was dismantled and transferred to a depot of Boston Borough Council who intend to erect it when a suitable location has been identified.

Bibliography


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