

THE PUMPING ENGINE HOUSE AT GLOUCESTER DOCKS

Hugh Conway-Jones

The pumping engine house at Gloucester Docks (Grid Ref. 826182) is a remarkable complex of various structures built to meet the developing need for water to be pumped from the River Severn to maintain the required level in the Gloucester & Sharpness Canal. Some smaller pumps were also installed to pump water out of the dry docks.

Soon after the canal opened in 1827, the Canal Company realised that the natural feeder streams were not adequate to maintain the water level in dry summers (1). Acting on behalf of the Exchequer Bill Loan Commissioners, who were supporting the Canal Company financially, Thomas Telford recommended a 45 horse-power steam engine offered by Graham & Co of Milton Iron Works, Yorkshire. The associated engine house (with a 90 ft high chimney and a culvert from the river) was built by W Rees & Son, who had recently built the North Warehouse, and the engine started pumping in April 1834 (2). The beam engine had a steam cylinder of 4ft 3in diameter and a pump cylinder of 3ft 10in diameter with a stroke of 8ft and was capable of supplying 0.5 million gallons per hour (3).

In the early days, pumping water out of the dry dock was done by members of the ship's crew, and on one occasion it was recorded that it took eight men seven hours to complete the task. However, it seems that a small steam pump was installed in 1847 to speed up the process, as the charges for the dry dock were then increased because the Canal Company were to do the pumping in future (4).

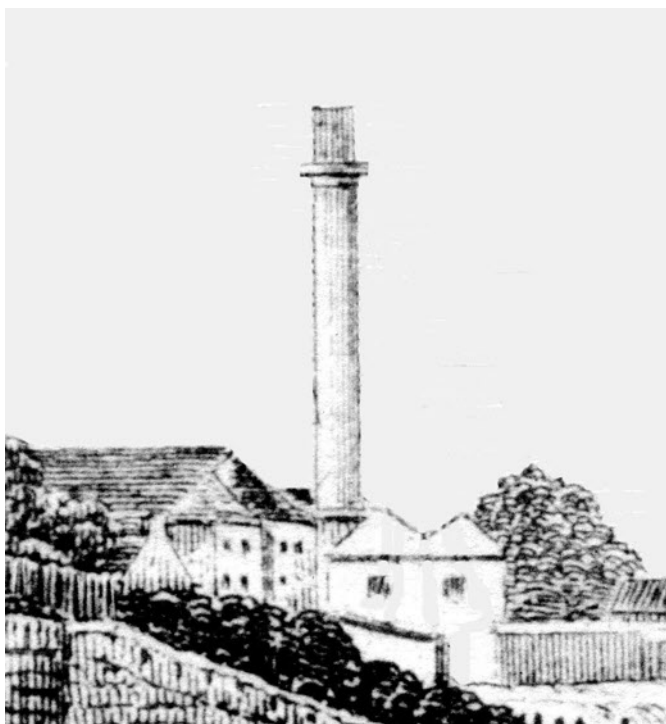


Fig 1. The original engine house viewed from the north.

Improved Efficiency

The big beam engine was adequate for several years, but as traffic on the canal increased, the loss of water through operation of the locks increased, and the expense of pumping became a concern. The Canal Company therefore arranged for the Neath Abbey Iron Company to make repairs and alterations to the engine to secure 50% more water with a reduction in fuel consumption of 20-30%. The work was carried out in 1852, including an extension of the engine house to the east to accommodate two new boilers (Fig. 2 and Ref. 5).

Two further additions to the engine house were also made in 1852 in connection with a new small pumping engine, supplied by the Neath Abbey Iron Company, that was needed to drain the large dry dock then under construction. An extension to the west housed a 12in diameter horizontal

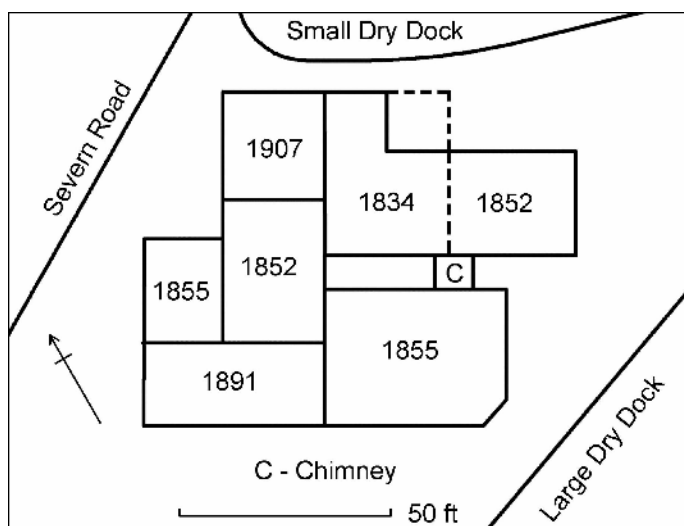


Fig 2. Plan of the engine house showing the date of each structure. The broken lines show the rectangular shape of the original 1834 engine house.

engine which drove two vertical pumps, and an extension to the south housed the associated boiler (6).

In spite of the improvements to the large pumping engine, the Canal Company soon experienced real difficulties in the exceptionally dry summer of 1854. Although the large pump was working night and day for three months, the canal at times was two feet below its proper level, and large ships had to transfer part of their cargo to lighters before proceeding up the canal to Gloucester (7). While the Canal Company were considering what to do, they were approached by the Local Board of Health who were in even greater difficulties. The city's reservoirs on Robinswood Hill had run

dry, and the Board of Health asked if the pumping engine could provide an emergency supply from the River Severn. Although there was considerable concern about the purity of the river water, two serious fires had convinced the Board that they had to act. The Canal Company agreed an additional pump could be attached to the engine, pipes were laid across the canal at Llanthony Bridge, and in just over a month the first water was pumped up to Robinswood Hill. There were some difficulties due to burst pipes and unauthorised operation of control valves, but the scheme provided much needed relief to the city for several months (8).

Second Beam Engine

Meanwhile, the Canal Company realised that they had to invest in more pumping capability for their own needs. They therefore arranged for the Neath Abbey Iron Company to supply another

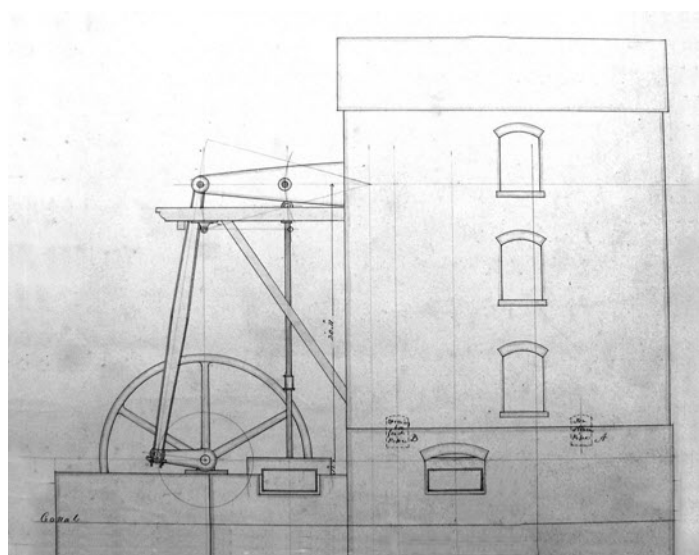


Fig 3. Original drawing of the 1855 beam engine and engine house viewed from the west. (Courtesy West Glamorgan Archive Service)

large beam pumping engine (Fig. 3) in a further extension of the engine house to the west. To accommodate two boilers for this engine, the building housing the boiler for the dry dock engine was taken down and replaced by a larger building housing all three boilers. The buildings were constructed by local contractors T & W Tredwell. The engine had a steam cylinder of 34in diameter, a stroke of 7ft, a beam weighing 10 tons and two pumps that could supply a total of 0.6 million gallons per hour. All was ready by November 1855, but during a trial attended by a representative from the Neath Abbey Iron Company, the flywheel shaft broke in two and the carriage holding it was also broken. Canal Company engineer William Cle-

gram recommended that the cast-iron shaft be replaced by a wrought-iron one, but the Neath Abbey Iron Company also blamed inadequate foundations, and the brick supports for the shaft were replaced by stone. The repaired engine started work in 1856 (9).

The two large engines did good service for the next 40 years, although there were some changes of ancillary equipment, particularly towards the end of that period. In 1880, a new Galloway boiler was installed in the 1855 boiler house in place of two old Cornish boilers, and ten years later it was the only serviceable boiler remaining. Engineer F A Jones raised concern about this situation, particularly as pumps had to be used intermittently throughout the year to drain water leaking into the dry docks, causing much cycling of the boiler. It was therefore agreed to buy a new small boiler to perform this intermittent work, leaving the big boiler only to be used for the continuous pumping needed to maintain the canal level in the summer. It was also agreed to put both boilers in a new extension to the west, which was completed in 1891. This left the 1855 boiler house available for the maintenance staff who were moving from Saul Lodge, and the 1852 boiler house was also cleared for a similar purpose (10).

Centrifugal Pumps

A few years later, Mr Jones raised concern about the total pumping power available, as there was a growing need to use the whole tidal basin at Sharpness as a lock for big ships with a consequent increase in the use of water. During the summer of 1896, pumping was needed daily for three months, and at night as well for at least two weeks, and even this was not enough to maintain the canal level. It was therefore agreed to obtain from Messrs Gwynne a centrifugal pump with 33in diameter input and output pipes, driven by a single-cylinder steam engine and capable of supplying 1.5 million gallons per hour. This was installed above the well of the original Graham beam engine, which was presumably dismantled. The new pump started work in May 1897 (11). To get the best out of the new pump, it was agreed to buy a new Lancashire boiler from Edwin Danks of Oldbury, and this was installed beside the Galloway boiler in 1898. Two years later the engine was compounded by the addition of a high pressure cylinder to save coal (12).

As the number of big ships needing to use the whole tidal basin at Sharpness as a lock continued to grow, concern about the increasing requirement to use the comparatively inefficient 1856 beam engine to supplement the new centrifugal pump. In 1907, therefore, a Gwynne 36in diameter centrifugal pump, driven by a single cylinder steam engine, was purchased second-hand from Liverpool Docks, and it was installed in a new extension of the engine house to the north-west. This was capable of supplying 2.2 million gallons per hour, but one difficulty was that the outfall was into the small dry dock, so the pump could not be used when the dry dock was occupied. At the same time, the Galloway boiler was replaced by one made by Tinker Shenton & Co, the flue between the boilers and the chimney was more than doubled in size to improve the draught and hence the efficiency of the boilers, and the remaining beam engine was dismantled (13).

Bigger Centrifugal Pumps

The two Gwynne centrifugal pumps gave good service for the next 35 years, but the combination of a busy time for traffic and a dry summer in 1943 stretched the pumping resources to their limit. The 33in pump was brought into service as early as April that year, and the 36in pump had to be used as well between July and October. This meant that the small dry dock was out of action for four months and the available enginemen and firemen were at times working up to 100 hours a week. To avoid this difficulty happening again, the canal engineer recommended replacing the 36in pump, which was nearly 60 years old, with a new electrically driven 48in diameter Gwynne centrifugal pump capable of supplying 2.8 million gallons per hour. As this

was considered important for the war effort, some government finance was made available, and the work was completed in mid 1945. At the same time, the discharge culvert from the 33in pump to the Main Basin was enlarged considerably so it could also carry the output from the new 48in pump, thus avoiding any outfall into the small dry dock. The new 48in pump did not require a supply of steam, but as the 33in pump was kept available in case of need, it was still necessary to retain the boilers (14).

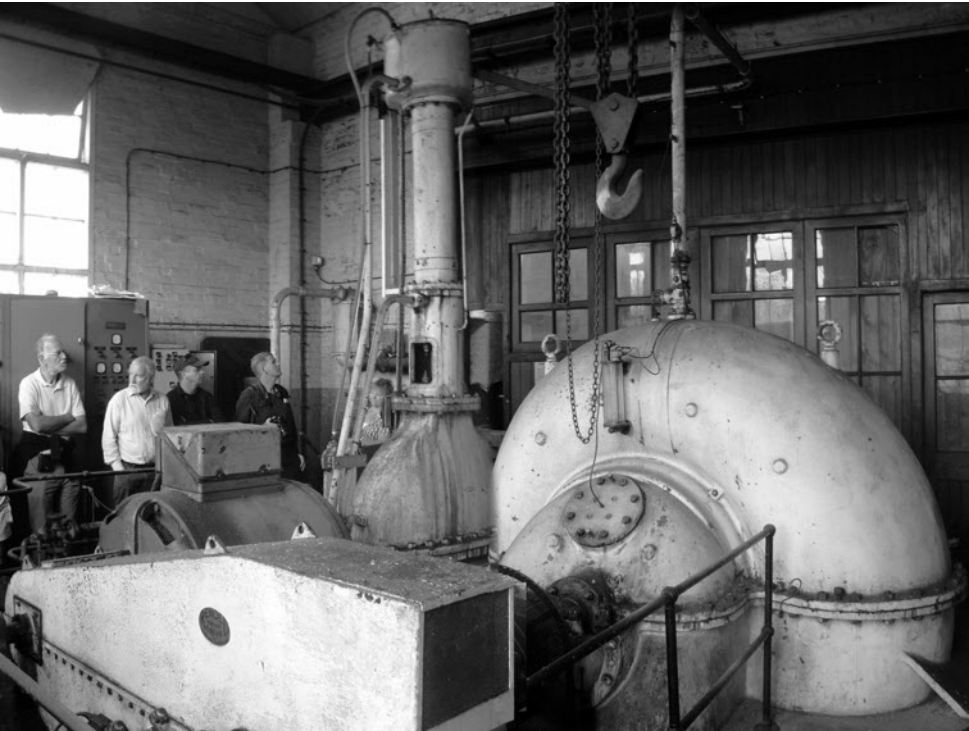


Fig 4. The 48in centrifugal pump installed in 1945

The next change in pumping requirements at Gloucester was not due to the operational needs of the canal, but because there were plans for large amounts of water to be extracted from the canal at Purton to provide drinking water to Bristol. As part of this project, another 48in diameter Gwynne centrifugal pump was installed in a new pumphouse to the north of the old engine house in 1966. This had a more powerful electric motor than the earlier 48in pump, and



Fig 5. Engine house viewed from the east



Fig 6. Engine house viewed from the north.

it could supply 3.4 million gallons per hour. The earlier 48in pump was retained as a stand-by, but as both were driven by electric motors, the 36in pump and two Lancashire boilers were removed to make space for improved workshop and staff facilities for the adjoining British Waterways Repair Yard, and the chimney built in 1834 was taken down (Ref. 15, Figs. 5 and 6).

Although the 48in centrifugal pump was retained, it was not used very often, and the main role of the old 'engine house' became the provision of facilities for the adjoining Repair Yard. This role continued until the Yard closed down in 1990, and then the premises were taken over by T Nielsen & Co who use the dry docks and the former Repair Yard buildings for the maintenance and repair of classic sailing vessels. The 48in centrifugal pump is still in situ, but it has not been used for many years.

References

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- (3) TNA RAIL 829/31 p.167.
- (4) TNA RAIL 829/31 p.16; RAIL 829/9 p.269.
- (5) TNA RAIL 829/10 pp.381-473; Swansea RO DD NAI M/444/5.
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