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THE HARWICH CRANE

By Jane Weeks

The oldest naval crane in Great Britain is to be found on Harwich Green at Harwich, Essex. It stood formerly in the old Naval Yard at Harwich but was moved to its present site in 1928 following the dismantling of the yard (Fig. 1).

The Naval Yard at Harwich was established in the mid 1650s by Oliver Cromwell as a shipbuilding yard; Harwich was chosen as the site for the new yard as the British were then at war with the Dutch. Sixteen years later, following the reestablishment of the monarchy, The Lord High Admiral, the Duke of York, visited the yard and found it to be in bad condition. Amongst other recommendations that the Admiral made in his report was that of the building of "a house crane (ie one enclosed in a small house) similar to that at Woolwich"[1]. Shortly afterwards, the crane was erected at a cost of £ 392. 0s. 0d. It was by no means the first crane to be built in the dockyard. A 1680 transcript of the Churchwarden's Book at Harwich records that in 1561:

"The Wardens receive of Mr. Edward Lambard of Brittlesea to ye townes use for ye craine Mr. Lambard did receive at ye hands of ye towneship at ye command of ye Queenes Mat^{ys}[2]

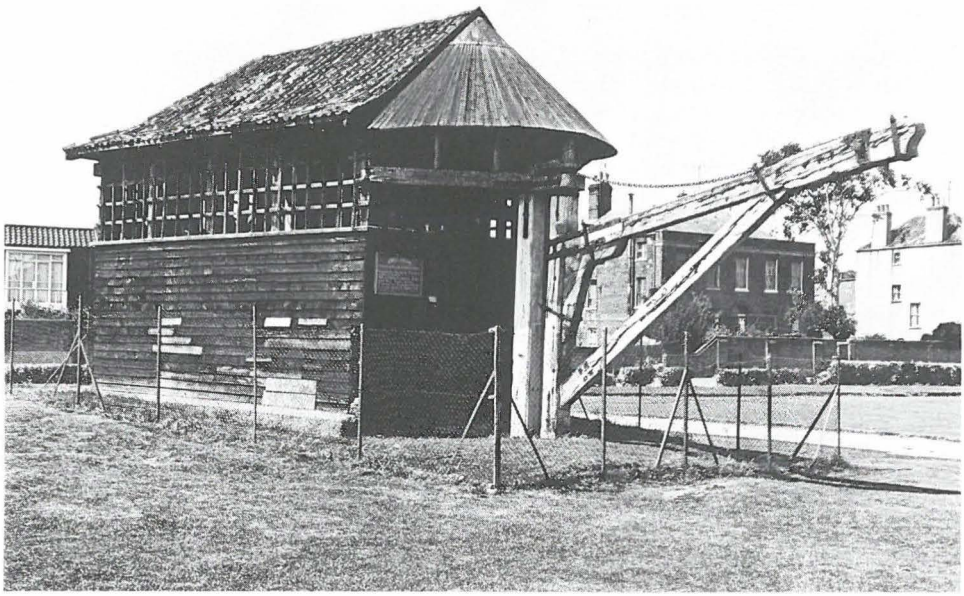

Fig. 1 *The Harwich Crane, in its present position. The wooden latticing, the roof tiles and the semi-circular shelter for the crane head are all later additions.*

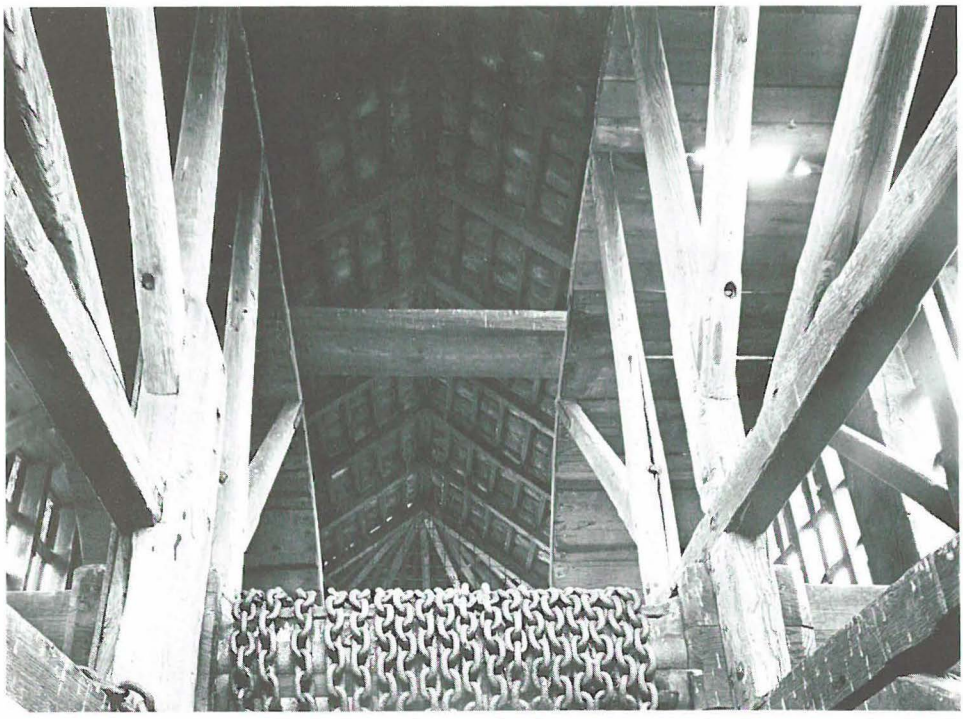

Fig. 2 *The Harwich Crane: detail of the axle. Note the change in cross-section from rectangular (on the sides) to circular (in the middle) in order to create a drum for the chain, and the iron bars which prevent the chain chafing the drum.*

Officers appertaining to her highness shipps Recd to ye use of ye towne for ye recommpense of ye sayd craine by ye hands of John £ 3. 6s. 8d."

Despite the Duke of York's recommendations, the yard continued to decline, partly due to the close of the Dutch war which meant the falling-off of orders for new ships, and partly due to the competition offered by the new Naval Dockyard at Sheerness at the mouth of the Thames estuary. In 1672, the Duke of York ordered that the Harwich yard was to be 'declined', as the site of the dockyard was too vulnerable to attack, and all vessels were transferred to Sheerness. In 1713 the Naval Yard at Harwich was officially closed by the Admiralty, though it continued in commercial use up until the late 1920s; the crane itself survived in its original position until that time and was still in use during the First World War.

The Harwich crane is of a type known as a treadwheel or simply wheel crane; goods are lifted out of vessels on to dry land by means of a jib which is operated by a pair of treadwheels powered by men walking on the inside of the wheels. The pair of treadwheels ensure a balanced action; each of the wheels is 16 feet in diameter and 3 foot 10 inches wide and they are spaced four foot apart on a common axle. The present axle is of pitch pine and was renewed in 1916; the wheels are made of oak planking. The axle has a diameter of 13 inches, where it passes through the wheels, and its cross-section is square, but in between the wheels, it has been smoothed to a circular cross-section in order to provide a drum for the chain (Fig. 2). To prevent the wood of the drum chafing, its surface is protected with eight flat iron bars[3]. The bearing is a stout iron pin revolving in a cast iron socket.

The wheels have 3 inch curbs which are connected to the planks which form the wheel casing (Fig. 3). On the inner surface of these planks are spiked triangular fillets which provide

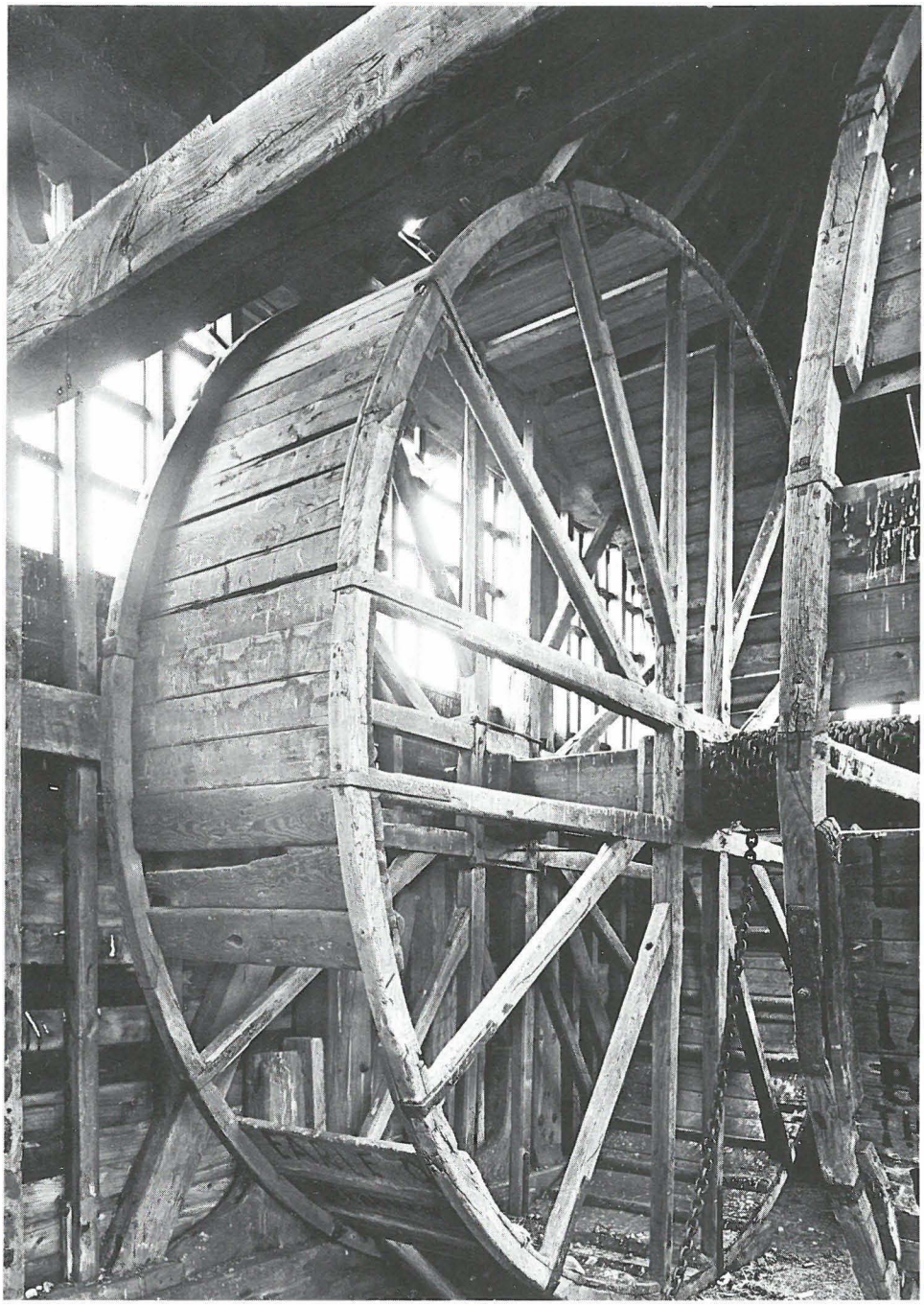

Fig. 3 *The Harwich Crane: interior view showing the treadwheels. Note the arrangement of the spokes of the wheel and the triangular fillets, nailed to the inside of the planking, thus creating footholds for the operators.*

footholds for the men operating the wheels. The various segments of the wheels have scarfed and wedged joints; because of their complexity, each piece is systematically numbered on each side of every joint, as was the custom in medieval woodwork. The wheel spokes consist of two pairs of spokes set at right angles to each other, halved at the intersection and clasping the axle to which they are secured by wedges. They are tenoned and pinned to the curbs[4]. In each of the resulting quarters of the wheel, two more spokes have been inserted which like the main pairs are chamfered on all edges; this construction, which appears to be weak, is in fact extremely strong.

The head of the crane consists of a large, horizontal beam which extends through the end wall of the crane house, where it is kept in position by a wedge (Fig. 1). Inside the crane house, this beam is supported on a cross beam and externally by a 1 foot square post. Diagonal braces both inside and out take up any lateral movement of the structure. The beam measures 18 inches wide by 15 inches deep but inside the crane house the lower portion is cut away and is fitted with a loose pulley close to the end wall. This pulley is for the axle chain which passes over it, then passes along a hole bored lengthwise in the beam to there crane end of the beam where two horizontal pulleys, fitted in a specially-cut slot, take up the lateral movement of the chain, when the jib is swung round.

The job projects for 18 feet and is framed with a 1 foot square post, an arm and a strut. For further strength, a big 'kneeler' (type of knee) is fitted between the post and the arm; these timbers, being visible, were carved with raised and moulded panels of decoration on their ends.

The crane house itself is heavily framed with oak; both ends are strengthened with stout diagonal braces and the sides are framed in four bays with 1 foot square corner posts and slightly smaller intermediates. These are also braced but it seems that the building must have become unstable at one point as it had been strengthened with numerous large 'kneelers', iron bolts and ties. The whole of the crane house was originally covered in oaken tarred weather boarding, but today, in order to light the interior, the upper courses of the weather boarding have been replaced with oak lattice. Likewise, the weather boarding of the single span roof has been replaced with pantiles. At the sea end the roof had been extended as a semi-circular arc to protect the crane head.

This treadwheel type of crane was used throughout the Middle Ages; other well known examples include that at Gdańsk and the manuscript illustration of a crane at Hamburg. The earliest references to this type of crane are to be found in Vitruvius' De Architectura, written in the first century B. C. He notes:

"If a larger drum-wheel be affixed either in the middle or on one of the sides (of the axle), of such dimension that men may walk therein, a more effectual power is obtained . . ."

Though built 1700 years later, the Harwich crane shows that an excellent design needs little alteration.

Footnotes:

1 There is no record of the Woolwich prototype, but the type was in common use at that period.

2 Queen Elizabeth 1558–1603.

3 This joint has now been strengthened with wrought iron straps.

4 There is no brake on the wheels, though a spar was kept handy which could be used an impromptu brake when levered against the outside edge of the wheel. Should the load have taken command, the men inside the wheels would have found themselves revolving backwards. In later cranes, such as the famous one in Gdańsk, the wheels were fitted with a strap brake.