

# INDUSTRIAL ARCHAEOLOGY NEWS

**94**  
AUTUMN  
1995

THE BULLETIN OF THE ASSOCIATION FOR INDUSTRIAL ARCHAEOLOGY

95 pence FREE TO MEMBERS OF AIA

## Liberty at Sea

Robert Carr



*The famous mass-produced Liberty Ship design was Britain's lifeline during the Battle of the Atlantic half a century ago. In June last year, the last unmodified survivor, the ss Jeremiah O'Brien visited Europe and there was an opportunity to visit her when she moored in the Pool of London before she returned home to America for the final time.*

At the height of the Battle of the Atlantic during World War II, merchant ships supplying Great Britain were being lost at a rate three times that at which British shipyards could hope to replace them. It was US innovation, mass production and organisation that plugged the shipbuilding gap and helped prevent Britain being starved out of the war. Prior to the late 1930s, America had for quite a long time not had much experience in merchant-ship building - it had almost become a lost art and the problem of producing new ships was tackled in a way a traditional shipbuilding nation was unlikely to have contemplated. The Liberty Ships as they became known were turned out in colossal numbers.

## Soap study

*Port Sunlight has been the subject of a photographic survey by a team from the RCHME. The results can be compared with the work of Bedford Lemure who photographed the model village in its newly built state from the late 1880s onwards. Port Sunlight was built by the first Lord Leverhulme (1851-1925) as a planned community around a series of tidal inlets on the Wirral Peninsula, with curving roads and tree-filled landscapes. Leverhulme held a close interest and even dictated the design of tenants' front gardens to ensure a uniform appearance. The RCHME study extended outside the core conservation area, identifying estate houses for agricultural (rather than factory) workers, and locating their architects and dates.*

A major figure in the Liberty Ship programme was the US construction engineer Henry J Kaiser whose previous experience had been with big dams such as the Hoover, Bonneville and Grand Coulee, and the San Francisco Bridge. He was not a shipbuilder. Merchant ship construction was revolutionised, huge numbers of identical welded (rather than riveted) vessels were built using prefabrication techniques in large yards that could employ relatively unskilled labour. About one third of the workforce were women.

To start with it took about 245 days to build a Liberty Ship, and the first, the *Patrick Henry*, was

launched on 27 September 1941. Construction time was gradually reduced to below 100 days and then ten days. Finally as a propaganda stunt, the *Robert E Peary*, yard number 440, was erected in a record four days 15½ hours. She was launched at Henry J Kaiser's shipyard, Portland, Oregon, on 12 November 1942. A total of 2,751 Liberty Ships were built by 18 yards: the largest number of identical vessels ever constructed. One might think of Kaiser as the Henry Ford of shipbuilding.

This immense constructional achievement solved the problems of finding ships to supply Britain across the Atlantic. However, the Liberty Ship design did acquire an unfortunate reputation as a consequence of structural failures. Being welded, any crack in the steelwork could spread right around the ship and from 1943 there were cases of vessels actually breaking in two while at sea. With a traditional riveted ship made from separate steel plates a crack is unlikely to propagate beyond the edges of the plate affected. In the Liberty design, stress was concentrated at the sharp corners of cargo hatches and there was a



**Ironbridge weekend • Industrial fallout • IRIS news • Newest Canal • Regional News  
Netherlands visit • Liberty Ships • Letters • Sheffield Society • Listing quandary**



Stern view of the *Jeremiah O'Brien* moored in the Pool of London, from the South Bank, June 1994

Photo: R J M Carr

major problem at deck level a short way in front of the bridge. The steel used generally was found to be inferior in strength at low temperatures and a number of failures occurred in Arctic seas. Very often failure would start from a bad weld.

However, the problem of brittle fracture was solved by strengthening and rounding critical hatch corners and riveting crack arrester plates in appropriate places. The Liberty Ship programme was certainly a success when one considers the wartime circumstances and that out of 2,751 ships built, 400 suffered fractures but just 90 of these vessels had serious problems. In 20 ships, failure was total but less than 12 actually broke in two. The *Robert E Peary*, rapidly assembled in record-breaking time, was quite long-lived, being broken up in Baltimore as late as June 1963.

The 50th anniversary of the landing of Allied forces in Normandy in 1944 was commemorated on 6 June last year. Among the ships which took part in the D-Day commemoration was the Liberty Ship ss *Jeremiah O'Brien*, the last survivor in operational condition of the more than 4,000 vessels which originally sailed for France. This ship is the only Liberty Ship in unmodified condition still seaworthy, still having sharp corners to her hatches and no crack arrester plates fitted. The efforts of Admiral Thomas J Patterson over a considerable number of years kept the vessel from being scrapped until 1978 when sufficient interest could be aroused to have the ship restored to working condition. She left Suisun Bay, where she had lain in reserve since February 1946, under her own steam on 6 October 1979.

In April 1994, she set off from San Francisco on a voyage visiting Portsmouth, Southampton, Chatham, London, Cherbourg, Rouen and Le Havre. At her several ports of call the public were allowed to visit most parts of the vessel in a very generous fashion and we had a glorious opportunity of examining at close quarters a traditional steam-powered ocean-going freighter still very much in working order. Although a 1940s welded ship, the basic overall design is in many ways not

so very different from vessels built in Britain at the end of the nineteenth century. Around 1941, it was the welded construction, now almost universal, that was relatively novel, the Liberty Ships otherwise being essentially conservative and by the standards of their time low tech. In conditions of wartime emergency more sophisticated technology was reserved for fighting ships rather than transports.

The *Jeremiah O'Brien* is 441 feet 6 inches long overall, has a beam of 57 feet and is 7,176 tons gross. Powered by a triple expansion steam engine driving a single screw, almost all other power comes from reciprocating steam engines of various kinds. Apart from many deck winches, the engine room is simply crammed with reciprocating steam plant such as pumps and generators, all in good condition and working – a veritable Aladdin's Cave for the steam enthusiast. The main propulsion engine is based on a design of the North Eastern Marine Engineering Co Ltd of Sunderland, England, and was built by the General Machinery Corporation, Hamilton, Ohio, number 7242, dated 7 May 1943. It is of the classic inverted-vertical type with cylinders 24½, 37 and 70 inches in diameter and a stroke of 48 inches, giving about 2,500 horse power at 76 rpm and a service speed of 11 knots. Steam at 200 psi is supplied by a pair of cross-drum sectional sinuous header straight-tube oil fired boilers. There are three sets of reciprocating steam powered electricity generators of inverted-vertical type each producing 20 kW of dc at 120 volts.

The keel was laid on 6 May 1943 and the ship was built in 56 days at Westyard, South Portland, Maine, by the New England Shipbuilding Company, and number 230. The hull shape is based on the British 'Ocean' design and the *Jeremiah O'Brien* differs from a traditional British freighter mainly in the accommodation for her crew who, apart from some gunners on the poop, are all put together in a single midship house. Conditions generally are better than was considered appropriate this side of the Atlantic. Visiting the crew's quarters and talking to the veteran volunteers who sailed the ship more than 7,000 miles was a pleasantly memorable experience.

It was originally intended that a convoy of three large old steam-powered cargo ships would

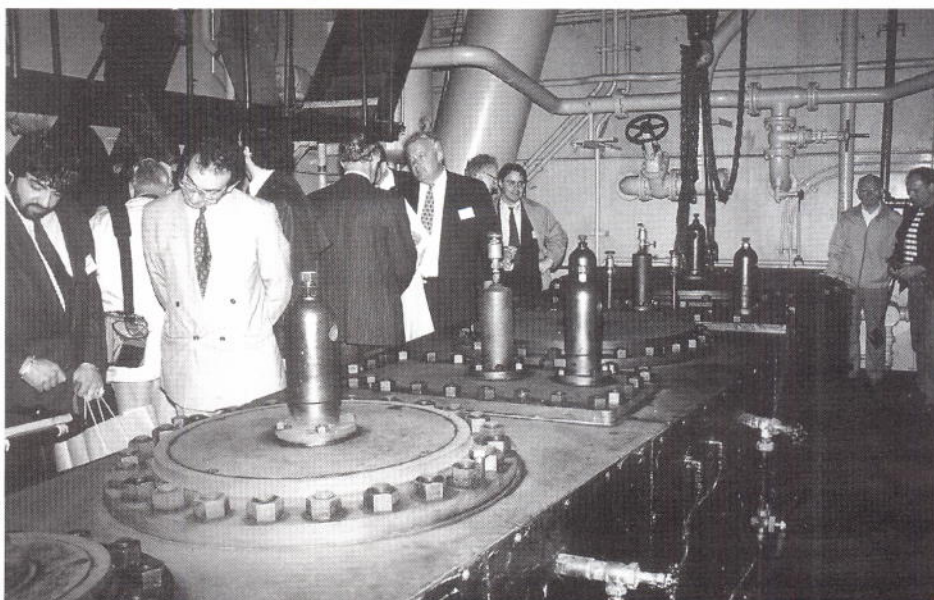


Showing visitors around the lower deck of the engine room, on board the *Jeremiah O'Brien*, Pool of London, June 1994

Photo: R J M Carr

cross the Atlantic to commemorate the 50th anniversary of D-Day. These were to be the Liberty ships *Jeremiah O'Brien* and *John W Brown* and the Victory ship *Lane Victory*. The Victory ships were a later, more sophisticated design which superseded the Liberties. The *Lane Victory*, built in 1945, dropped out with boiler trouble and the *John W Brown*, built at Baltimore in September 1942 and in use in New York as a stationary school ship until 1982, had to cancel her voyage owing to lack of funds to cover repairs.

The *Jeremiah O'Brien* has since returned to her home port and is most unlikely ever to cross the Atlantic again. Bringing an elderly Liberty ship to Europe was quite a perilous undertaking and even when the present writer last visited the *Jeremiah O'Brien* there were considerable financial problems and no money to buy oil fuel for the voyage home. The National Liberty Ship Memorial Inc is a Californian non-profit-making corporation which restored and maintains the vessel. If you would like to know more, contact the ss *Jeremiah O'Brien*, Building A, Fort Mason Center, San Francisco, CA 94123-1382, ☎ 415 441 3101, Fax 415 441 3712. □



Top of the triple-expansion engine of the *Jeremiah O'Brien*, Pool of London. At lunchtime the ship was invaded by eager City gents.

Photo: R J M Carr

# AIA visit to the Netherlands

Janet Spavold

This was a most successful trip, packed with interest throughout. Our visit was arranged by Jur Kingma and Jan Vanbruggen, who were also our guides.

**Wednesday:** After an overnight Harwich-Hook of Holland sailing, we breakfasted in Schiedam at De Branderskelder, a brewery museum originally built as a hospital. A walk through the canal and river port of Schiedam followed. Here we saw our first windmills – the tallest in the world, and without fantails or patent sails. Scheidam made its fortune through the gin distilleries. We toured the De Tweelingh branderij, built in 1795, which is the only one now using pot stills. We briefly viewed the Maritime Museum in Rotterdam, on the way to the windmill complex at Kinderdijk. The Alblasserwaard region has been drained since the tenth century. As the peat subsided and river levels rose, gravity drainage was inadequate. Wide canals acting as reservoirs were built, and post mills with a hollow post to house the drive shaft raised the water. The gearing is at the base, with Archimedean screws. The Museum of Dredging at Sliedrecht records an important industry. It has a preserved dredger, and models of dredging methods; one, which operated for us, was a dredger working in sand in a large tank. Vreeswijk was an interchange for trade between the ports and inland towns; its first locks were built in the fourteenth century. A series of subsequent locks accommodated the growing traffic.

**Thursday:** Dr Aijolt Brogers accompanied us and explained the problems of geology, water control, drainage and endikement. We saw the effects of the creation of polders and the increasing use of land for agriculture, and traces of the January emergency this year. At Loenen we visited De Middelste Molen, a steam and water-powered papermill, guided by two papermakers. Watercolour paper is made, using English machinery dated 1890. Next, to the Maritime Archaeology Museum at Ketelhaven on Flevoland Polder, the most recently created. We visited the museum and its conservation workshops where the staff explained their philosophy and work. The Zuiderzee could produce dangerous seas over its shallows, but it was an important fishing ground and trade route. Once the IJsselmeer was created

in 1932, polders were drained and wrecks appeared. They are recorded and excavated according to their maritime importance. 435 wrecks dating from the thirteenth to the nineteenth centuries are known. The Hertog Reijnout steam-powered scoop wheel drains the Arnhemheem endikement at 340 gallons per minute. The steam engine is by Backer & Rueb (1882) and is a horizontal single cylinder double-acting engine of 23 inch bore and 25 inch stroke. The boiler is a Cornish type, with flametubes. In 1983 the engine was passed to a trust; restoration cost £500,000.

After dinner we were introduced to the Netherlands Institute for Industrial Heritage (PIE), which has a programme to conserve key non-movable industries and set up a collection of movable items before 2000. About 40 branches of industry have been identified. A branch history was completed first and then used to produce a typology for it. Sites were ranked according to three criteria (socio-economic, technological and how complete they were). Typology definitions were issued to local volunteers who decided the site's importance. Recommendations for the site's future were made on that basis. There are pilot schemes for re-use and adaptation, tourist development and media involvement. Business is involved, and it is intended to establish a Chair in Industrial Heritage.

**Friday:** The Railway Museum at Utrecht, where the major problem is that the exhibits are out of doors. The curator discussed restoration policy. As they only have ten steam engines they operate with replicas but they do run a 'reservation plan' for current equipment. I thought the stars were the Orient Express coaches, magnificently restored in 1974. Two windmills at Westzaan, De Schoolmeester (1692) for papermaking and Het Prinsenhof (1722) for barley hulling were next. After lunch we moved to Wormer and were shown over the Lassie rice factories. The disused Art Deco building will be preserved; the series of older brick buildings contained cast iron or wooden columns and girder beams. The elevator and silos date from 1916: a good example of modern plant in an old building. Jur Kingma provided a detailed commentary as we travelled by riverboat to Amsterdam, where we walked around the nautical

quarter.

**Saturday:** At Lelystad we saw the Missouri stern-wheeler *Mark Twain* and the replica East Indiaman *Batavia*. After a detour for a small shiplift at Broekerhaven we visited the Nederlands Stoommachinemuseum, opened in 1985 at a pumping station which used two 1898 horizontal compound steam engines to operate four centrifugal pumps. In 1924 a Backer & Rueb unaflo engine was installed and worked until 1972. This engine and many others are displayed in steam. We travelled from Medemblik to Hoorn by steam tram. The track operated from 1887 to 1934, briefly in the late 1940s, and then as a tourist attraction from 1972. The engines have been restored; we were hauled by No 16, and saw GS18 *Leegwater*, a side-fired box type. The sheds and workshops were visited too. The final highlight was the massive and impressive Cornish engine from Harvey's of Hayle at Cruquius. It was one of three which drained the Haarlemmermeer between 1848 and 1852; it worked until 1933. The cast-iron tower wall supports eight beams; the engine uses compound internal expansion, with two cylinders, one inside the other. The external diameter is 144 inches. Other engines were displayed here.

I was greatly impressed by the English translations provided at our visits. Many were done specially. Planning was meticulous throughout and the work of all our guides at the sites was much appreciated. Paul Saulter of Heritage of Industry arranged our travel and accommodation at Driebergen and David Alderton made the AIA arrangements. □



left: The forest of windmills at Kinderdijk: the popular image of the Netherlands

top: Anne Alderton receives instructions in papermaking from Mr Zegers, the owner of De Middelste Molen paper mill at Loenen

above: Members in the cap of one of the 19 pumping windmills at Kinderdijk