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# PROPOSED CIRCULAR FERRY FOR THE MERSEY

*by Gordon Bodey*

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In 1861, John Elder, the Glasgow shipbuilder, introduced a general design for a flat-bottomed circular vessel. He said that such a vessel would have minimal draught, small freeboard, maximum stability and would roll very little in a seaway. He also thought that such a vessel would form a very stable gun platform for even the heaviest guns of the time, and that its stability would also make it an admirable pleasure yacht or ferry craft.

At this time the Mersey ferries were side-paddle driven, but the paddle boxes not only made it difficult to tie them up at the landing stage when the river was boisterous, but they also impeded the loading and unloading of a vast and ever-increasing number of passengers. Also, the Mersey Docks and Harbour Board (M.D.H.B.) had plans to improve vehicular access to the landing stages in order to promote a sharp increase in vehicles using the ferries.

The conditions for passengers on board the ferries then were extremely unwholesome. In his report of 1862 Mr G. Harrison, the Birkenhead Ferries Committee Chairman, described the below-decks cabins as 'the most miserable places and no person will enter them unless obliged to do so'; and this when the Mersey ferries were carrying over ten million passengers a year. Clearly, more suitable and congenial vessels were long overdue.

By this time, screw propulsion was both proven and commonplace: in 1856 the Royal Navy had no fewer than 163 vessels specifically listed as screw-driven, compared to 108 listed as paddle-driven. This in itself was remarkable in view of the fact that Francis Pettit Smith had had great difficulty in persuading the Royal Navy to adopt screw propulsion only fifteen years before that date. By 1865 the figures had risen to 409 screw-driven (of which 125 were gunboats), and 99 paddle-driven vessels, the majority of the latter being tugs, tenders or store ships. However, conventionally designed vessels using screw propulsion do not seem to have been considered for the Mersey ferries at this time.

Instead, on 19th August 1863, the M.D.H.B. instructed its dock engineer G.F. Lyster to prepare a report into the feasibility of adopting the circular-vessel principle advocated by Elder to the Mersey river ferries. The possible use of circular vessels appears to have been seen as a viable alternative because: firstly, with much greater carrying capacity they would accommodate both passengers and vehicles – the passengers in relative comfort and with ample room for the vehicles; secondly, they could be moored in semi-circular bays in the landing stages allowing rapid discharging and loading by way of four passenger exits on each quarter and a central gangway for vehicles; and thirdly, in operation they would present minimum broadside and therefore least resistance to the almost ever-present strong tidal flows of the river.

However, none of the Mersey ferries came under the authority of the M.D.H.B.; its control was restricted to the landing stages where the ferries berthed. The ferry service to Woodside was owned and administered by the Birkenhead Improvements Commission and had been since it took possession of all ferry property and rights on 31st August 1860. The Seacombe service had been acquired from private

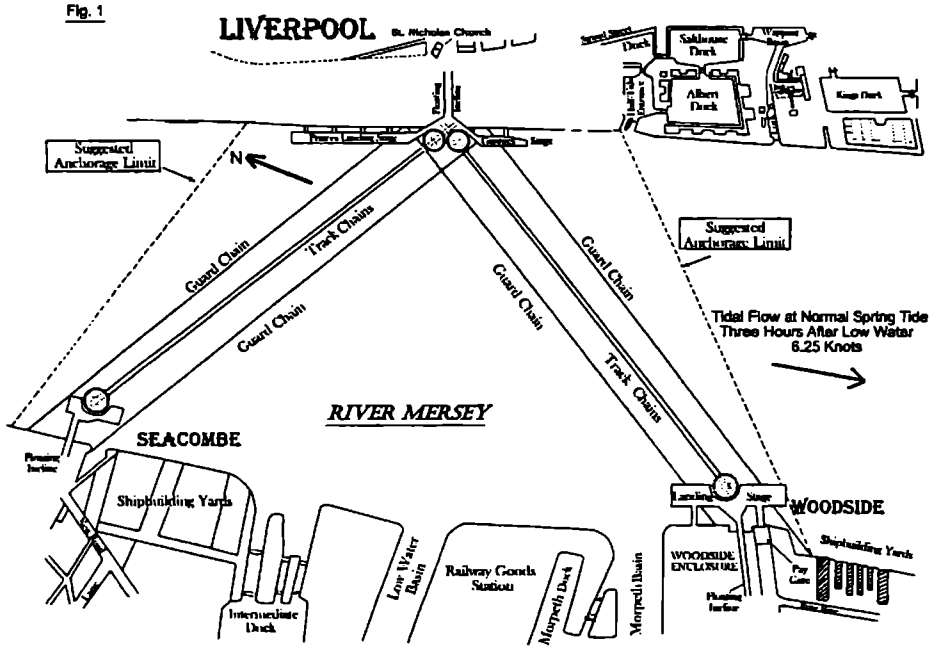
ownership by the Wallasey Local Board on 1st August 1861. Both were municipal bodies. It might be supposed that the M.D.H.B. was considering seeking to acquire the ferry services and the scheme was being prepared ahead of a prospective takeover, but this is not known.

By 20th January 1865 Lyster had completed an elaborately-detailed and expensively-prepared set of plans for two such craft, one each for the services between Liverpool and Birkenhead Woodside, and Liverpool and Seacombe. Also, a plan of their routes and their peripheral safeguards was presented on another sheet. Each craft was to have a diameter of 101ft, a draught of 4ft and a freeboard of 8ft.

Lyster's circular ferry plan, however, was only part of a massive civil engineering project apparently being considered to restructure that section of the dock system between Waterloo Dock to the north and the Albert Dock to the south, and which would have affected an area half-a-mile long on either side of the ferry terminal at Liverpool (and whose main proposals were set out on the same plan). Only those parts of the plan concerning the circular ferry are shown and discussed here.

In the river plan for the circular ferries (Fig.1), Lyster proposed a propulsion system whereby they hauled themselves (by means of internal engines set athwartships) across the river along pairs of track chains[1] laid on the river bed and secured to the walls lining the river: one pair each from Liverpool to Woodside and Seacombe; each landing stage being 1,300 yards and 1,220 yards respectively from Liverpool Pier Head.

Fig. 1

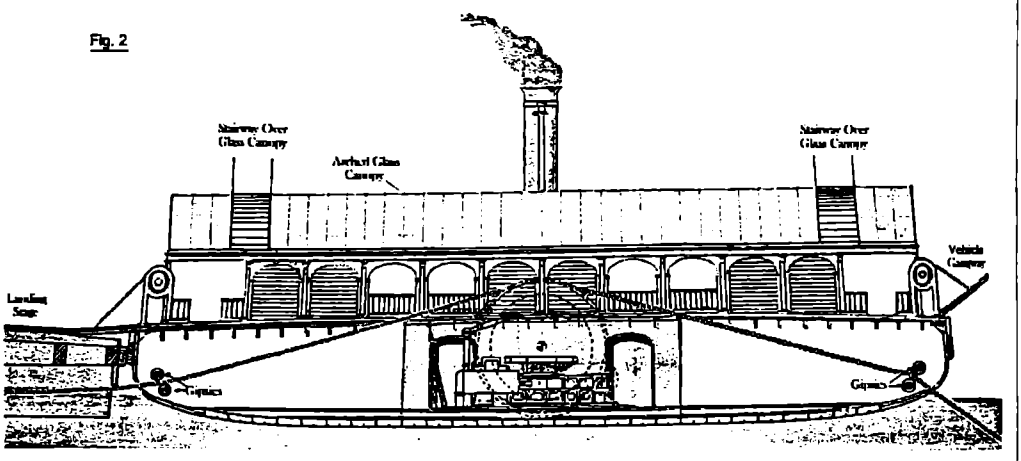



**1865 Plan of Proposed Routes of Circular Ferries**

Because of the large tidal rise of up to 33ft and a strong tidal flow, which at that time at ordinary spring tides reached 6¼ knots in mid-river at three hours after low water, the track chains at their middle points were expected to move from side to side by up to 40 yards. Their presence, let alone their unpredictable positions, was not favoured by the river pilots.

To safeguard the track chains there was to be a non-anchoring zone extending about half-a-mile outside each crossing in mid-river; there were also to be fixed guard chains on the river bed some 240ft outside each track chain to prevent fouling of the track chains should an anchored vessel drag its anchor.

Each vessel's two track chains would enter and leave the vessel 18ft either side of the adopted centre line, and pass through a set of guide pulleys fore and aft called 'gipsies' just inboard and just above the waterline (Fig.2). These would have rotated on shafts secured to side thrust blocks to take the pressure of the tidal current.



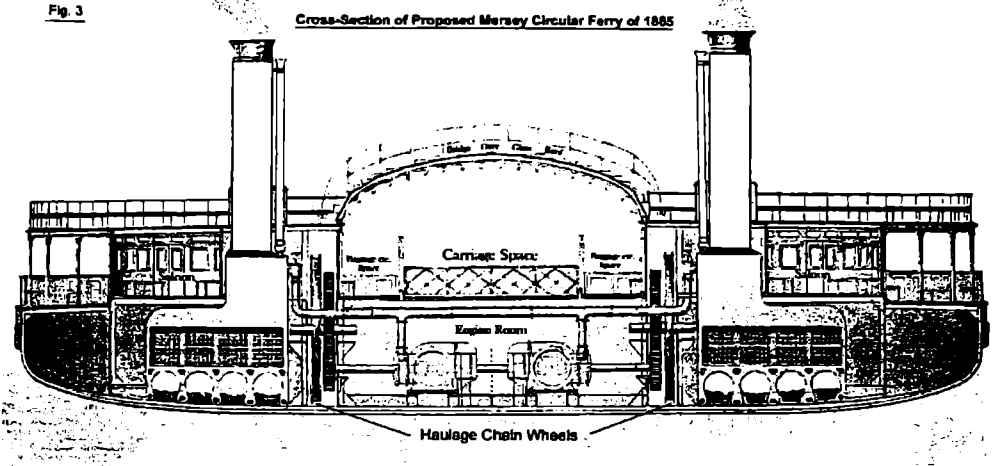

Longitudinal Section of Proposed Circular Mersey Ferry

In passing through the vessel each chain would pass upward and over a large haulage wheel, with built-up rims forming a containing channel, in order for the vessel to literally haul itself across the river along the chains. However, the wheels as shown are smooth-surfaced with only a small section of each wheel being in contact with its chain and it is difficult to know if sufficient traction could have been obtained for the purpose, but it seems that Lyster thought so.

Each of the haulage wheels was to be fixed on its own small shaft at either extreme side of the engine compartment (Fig.3). These shafts would each turn as an inner adjacent large cog wheel on the shaft was driven round by a small pinion attached to each end of the main driving shaft of the engine. This was located some 10ft aft of, and 4ft lower than, the shafts holding the haulage wheels. The power to drive the mechanism would come from a horizontal twin-cylinder steam engine fitted athwartships.

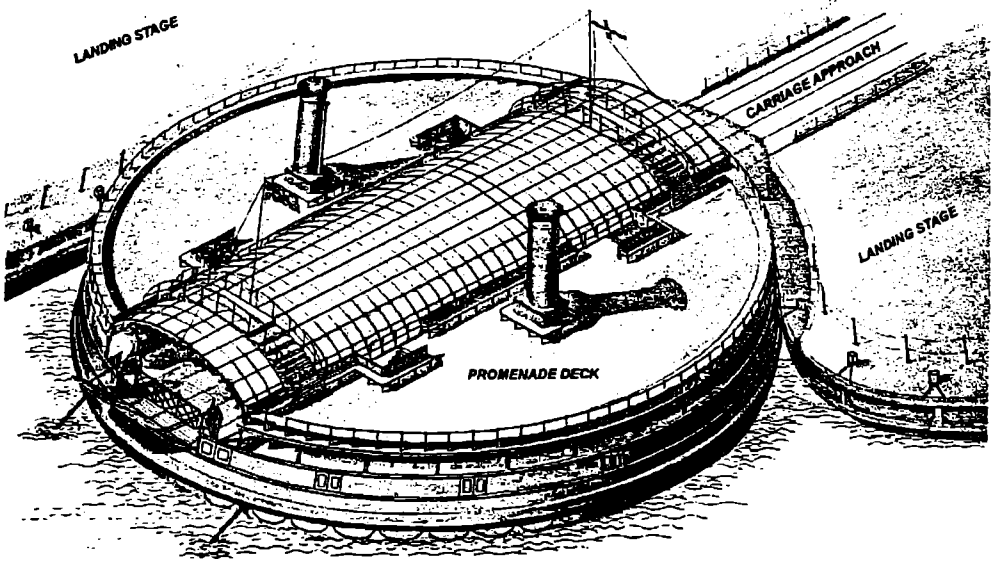
Fig. 3

Cross-Section of Proposed Mersey Circular Ferry of 1885




On board the ferries each form of traffic was to be segregated: all vehicular traffic would be accommodated in a central, 18ft-wide carriage space the full length of the vessel, and on each side of the carriage space would be a separate 5½ft-wide baggage and parcels space. The whole 29ft-wide central area was to be covered with an arched glass canopy whose centre was to be 14½ft above the main deck. The foot passengers were to occupy what were termed 'handsome saloons' arranged as half-moon structures either side of the central vehicle and goods area. Outside the saloons

ISOMETRIC VIEW OF PROPOSED FERRY-BOAT



and around the perimeter, except where the wheeled traffic exits were located, were to be spacious covered walkways. Above the main deck would be a promenade deck on either side of the glass canopy; each side being connected by two bridges over the canopy. Two companionways in each saloon provided access to the promenade deck. There is no indication on the plan for the provision of life-saving equipment.

In the event, neither the circular ferry nor that particular dock restructuring proceeded beyond the plans. No record of the original report or of any discussion of the plans as laid on the table (if, indeed, they ever were) has been found in the Minutes of the meetings of the Board, its Marine Committee or the Finance Committee. The Engineer's department records are un-catalogued as yet, and therefore not available.

Even assuming that the control of the ferries had eventually devolved to M.D.H.B., the project may have been abandoned when other possible problems were foreseen e.g. that 'slamming', the lifting of the hull clear of the water and its subsequent belly-flopping in boisterous conditions would have proved highly uncomfortable, alarming and possibly disastrous; it may have been that such craft could not have maintained the required frequency of services.

Of course, even if the proposal had been feasible from the operational and technical points of view, it may have been considered economically unviable in terms of capital outlay and operational costs. J.W.King, sometime Chief Engineer to the U.S. Navy said of the concept in 1879 – albeit speaking of a screw-propelled version – *"...the most serious objection to the circular form of vessels consists in the extra-ordinary steam power necessary to drive a vessel ..... through the water at a speed equal to that of the ordinary vessel of the same carrying capacity."*

Oddly, screw-propulsion was not adopted in the ferries until 1879 with the introduction of the double twin-screw luggage boat **Oxton**. The last paddle steamer on the Birkenhead ferries, the **Birkenhead**, went into service in 1894 and operated until 1907. Then sold to the White Star Line, she was renamed **Gallic** and used as a tender at Cherbourg until broken up at Garston on the Mersey in 1913. Wallasey Ferries' last paddle ferry, the **John Herron**, did not enter service until 1896, although by then screw-propelled vessels were also in service.

### *Postscript*

Elder's circular design was briefly realised when it was adopted by Vice-Admiral Popov of the Imperial Russian Navy who had two such vessels built between 1871 and 1875. The **Novogrod**, 101ft diameter and 2,490 tons displacement, mounted two 11in. breech-loading guns. Driven by six propellers in line abreast she had an average operating speed of 7½ knots. A complement of 110 officers and men was carried.

The **Vice-Admiral Popov**, 120ft diameter and 3,500 tons displacement, mounted two 12in breech-loading guns and four small-calibre guns in the breastwork. She was also driven by six propellers in line abreast but was more powerfully engined and had a top speed of 9 knots. Her complement was 120 officers and men. The upper deck of both vessels was cambered from the breastwork to the gunwale, and both were twin-funnelled. Baird of St Petersburg built both vessels and they were for use in the Black Sea inshore waters where the limiting depth of water was some fourteen feet – too shallow for conventional ironclads.

The **Vice-Admiral Popov** was reportedly used on occasion as a 'yacht' by the Tsar.

Oddly, the use of such a craft as a yacht would have revealed a curious anomaly with regard to its registered tonnage. Thames Yacht Club Tonnage Rules at that time defined a vessel's tonnage as:

$$\text{Tonnage} = \frac{(L-B)\,B^2}{188} \text{ (where L=length and B=breadth)} = \frac{0 \times 0}{188} =$$

a conundrum as the rules of the Royal Yacht Squadron (of which the Tsar was a member) stipulated that a member's yacht must be of not less than ten tons register. However, the Committee does not seem to have been tested on that point!

A compromise design built for the Russian Navy by Elder's Fairfield Yard was the **Livadia**. She was built of steel and at 230ft x 153ft she had a displacement of 4,420 tons. The **Livadia** had three keels and was driven by three four-bladed propellers with the single rudder aft of the central propeller. On trials over a six hour run an average speed of 15 knots was achieved, and over a measured-mile run, 15·8 knots. However, she was not fitted out as a warship.

***Endnote:***

[1] This method of cross-river haulage using steam engines was introduced by the eminent engineer James Meadows Rendel (1799-1856) in 1831. Between 1832 and 1834 he applied the principle to floating bridges across the River Dart at Dartmouth, and across the Tamar at Torpoint and at Saltash. Others were to be built across Poole Harbour, and a chain-haulage ferry (not circular) from Portsmouth to Gosport about 1835. At the present day such a ferry – the King Harry ferry – is still operating on the short crossing of the River Fal at Trelissick in Cornwall.

Interestingly, when not yet aged 20, as a surveyor working for Thomas Telford, he carried out a survey of the Mersey at Runcorn for the proposed erection there of an iron suspension bridge. In 1843 he devised plans for Birkenhead docks which he strenuously defended before parliamentary committees, and from 1850 to 1853 he oversaw the construction of the first dock at Garston on the Mersey. His achievements, other than the above, were both innovative and numerous, and included the survey at Heppens (then a fishing village) on Jade Bay, on the North Sea, in 1853/54 for the Prussian government, which resulted in the building of the German naval base of Wilhelmshaven.

***Acknowledgements and Sources consulted:***

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