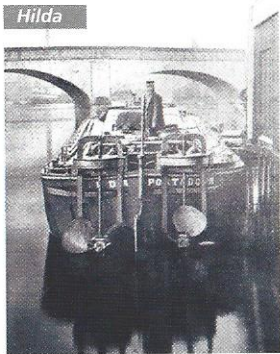


THE BARCROFT PROPELLOR

Mike Clarke



Henry Barcroft was a Newry-based inventor and JP involved in the Bessbrook Spinning Mill for whom he designed the 'Bessbrook' loom in 1869, an improved form of damask loom. He was also behind the Bessbrook & Newry Tramway, built in 1885, which connected the mill with the town and port of Newry. It used electric traction generated by a 56HP water turbine, and closed in 1948.

(www.trainweb.org/i3/dkc/dkc-bnt.htm) His interest in transport led him to consider the problem of how to replace horse towage on the canals in the north of Ireland. Not only were they narrow and weed-filled, but boats also had the problem of crossing Lough Neagh. As they were not used enough to be highly economic, the answer had to be cheap and easy to install on existing boats. He came up with an unusual design, a steam driven semi-immersed propellor.

He began experimenting in the early 1890s using a 60 ton lighter, and by 1894 had an acceptable device. The system consisted of two large semi-immersed propellors which allowed boats to sail in shallow water where a small propellor would get tangled up in weed. Several boats used the system on the Newry and Ulster Canals, and in April, 1894, it was tried on the Grand Canal, where the necessary machinery was fitted to boat No 34 which towed No 35. Amongst those invited to inspect the trial was John Moss, who looked after the steam boats on the Leeds & Liverpool Canal, and his report gives a good description of the system and its operation. It is interesting to note that when the GCC introduced new steam powered boats later that year, the engines used were built by the same firm, William Wilkinson of Wigan, who supplied the Leeds & Liverpool Canal.

The barge upon which the above system has been applied, belonging to the Grand Canal Co., Ireland, is about 58 feet long and 13 feet beam. At the time of inspection it was carrying about 8 tons of cargo with a barge in tow also carrying about the same weight.

The two propellors, 4 feet 10 in dia. and about 5 feet 3 in pitch, are suspended on an iron or steel frame which may be adjusted to suit the varying draught of the barge. The engines are a pair of horizontal 4.5 in dia cylinders, with a stroke of 8 in., the crank shaft of which is connected to a shaft at

each end upon which is keyed a bevelled or helical pinion, geared into a vertical shaft, which again gears into a bevelled wheel on the propellor boss. Steam is supplied to the engines by means of a locomotive type boiler placed on deck fore and aft, alongside of which (also on deck) are the bunkers for carrying fuel. The engines run at a speed of about 180 rpm and the propellors are geared probably at 152 or 90 rpm.

The system is certainly novel, but very unlikely to commend itself to carriers or steam ship owners. As soon as the engines are started there is a violent commotion in the water owing to the propellors being only half immersed, and the vibrations as each blade strikes the surface of the water are carried through all the gearing and the engines. The boat is of course suffering at the same time from the excessive strains which are set up by the same cause, and is certain to sustain much damage by the continuous shaking. The propellors are, from being so much exposed owing to the great area required by their large diameter, always in danger of damage by running on the slopes: in fact on the first trip one was broken, and a narrow escape of another whilst the writer was on board, although in the nine miles steamed under inspection, only one boat was met with or passed. Although the steamer and boat was only, comparatively speaking, light, and the pull on the tow rope so slight that most of the time under way it was lying in the water, the consumption of fuel was more than any new boat which we have had engaged since I have been in the company's service.

I might by going into details of construction make a rather voluminous report — enough that I mention that the design and construction of the whole is of such a nature that it would be totally unfit for use for any lengthy period, either on this or any other canal in its present state.

His observations were much more pessimistic than those of the inventor, who wrote papers on the design for the Institution of Mechanical Engineers. There was much criticism of the system, suggesting that efficiency would be low, though Barcroft thought that at the low speeds used, the propellors would not waste too much power. Its main benefit was that it could be fitted to existing horse boats without any alteration to the hull, and both he and other engineers thought the system could easily be adapted for use with internal combustion engines or with electric motors. A rather similar design, but with a more conventional propellor, was suggested by the Universal Sliding Propellor Co of Brighouse, Yorkshire, in 1921.

Of the boats using the system, the following have been identified:

- *Ulster*, built 1893, had covered 2000 miles by mid-1894, travelling as far as Clones.
- *Newry*, built 1894 for the Portadown Carrying Company at Larne, 62 feet by 11.5 feet, and 5.5 feet draft, to carry 85 tons.
- *Hilda*, 80 ton lighter built for the Portadown Carrying Company. The boiler was in the hold as there was just 2 feet 4 inches clearance under the Lagan Navigation bridges.
- *Tyrone*, built 1894 at Newry for the Ulster Steam Lighter Company, 60 feet by 14.5 feet, and 4 feet 10 inch draft to carry 65 tons.
- *Armagh*, possibly built 1894/5. Tested unsuccessfully on the Leeds & Liverpool Canal in 1895. The section of canal used has many turns, and the boat had to be stopped at several to help turn the boat. It was noted that two or three men were needed at the tiller round the bends.
- *Agnes*, no further details.
- Pleasure boat, built at Newry, to carry 124 passengers on Carlingford Lough.

More details can be found in the report of Barcroft's lecture to the Manchester Branch of the Institution of Mechanical Engineers published in *Engineering* on 10th August and 5th October 1894, and in his paper published in the *Transactions of the Institution of Mechanical Engineers* in 1897, also reported in *Engineering* on 26th February 1897. There are also reports in the *Newry Telegraph*: 8th May 1894, 20th October 1894, 24th September 1895; *Newry Reporter*: 21st June 1894; *Irish Times*: 17th April 1894, 19th October 1894, 25th September 1895, 3rd July 1899; *Motor Boat*: 28th October 1921. Other information came from the L&LC Correspondence Files and from Brian Goggin and Ruth Delany.

Mike Clarke became involved with canals in 1970, and is best known for his work on the history of the Leeds & Liverpool Canal. He has also researched the history of European waterways and the development of the canal lock, and his travels have included many visits to Eastern Europe, 'working' on a 1200 tonne boat in Germany, and assisting those compiling the World Heritage application for the Grand Canal in China.

