WIRE ROPE TOWAGE.

We have from time to time given accounts in this journal of the system of towage by hauling on a submerged wire rope, first experimented upon by Baron O. De Mesnil and Mr. Max Eyth. On the river Rhine the system has been for many years in successful operation, and we this week publish from *Engineering* a view of one of the wire rope tug boats of the latest pattern adopted.

Our contemporary gives the following particulars:

The Cologne Central Towing Company (Central Actien-Gesellschaft für Tauerei und Schleppschifffahrt), by whom the wire rope towage on the Rhine is now carried on, was formed in 1876, by an amalgamation of the Rührorter und Mülheimer Dampfschleppshifffahrt Gesellschaft and the Central Actien-Gesellschaft für Tauerei, and in 1877 it owned eight wire rope tugs (which it still owns) and seventeen paddle tugs. The company so arranges its work that the wire rope tugs do the haulage up the rapid portion of the Rhine, from Bonn to Bingen, while the paddle tugs are employed on the quieter portion of the river extending from Rotterdam to Bonn, and from Bingen to Mannheim.

The leading dimensions of the eight wire rope tugs now worked by the company are as follows:

	Tugs No. I. to IV. Meters. ft. in.	Tugs No. V. to VIII. Meters. ft. in.
Length between perpendiculars..	39=126 0	42=137 10
Length over all.....	42·75=140 3	45·75=150 1
Extreme breadth..... ..	7·2 = 23 8	7·5 = 24 5
Height of sides.....	2·38= 7 11	2·38= 7 11
Depth of keel	0·12= 0 5	0·15= 0 6

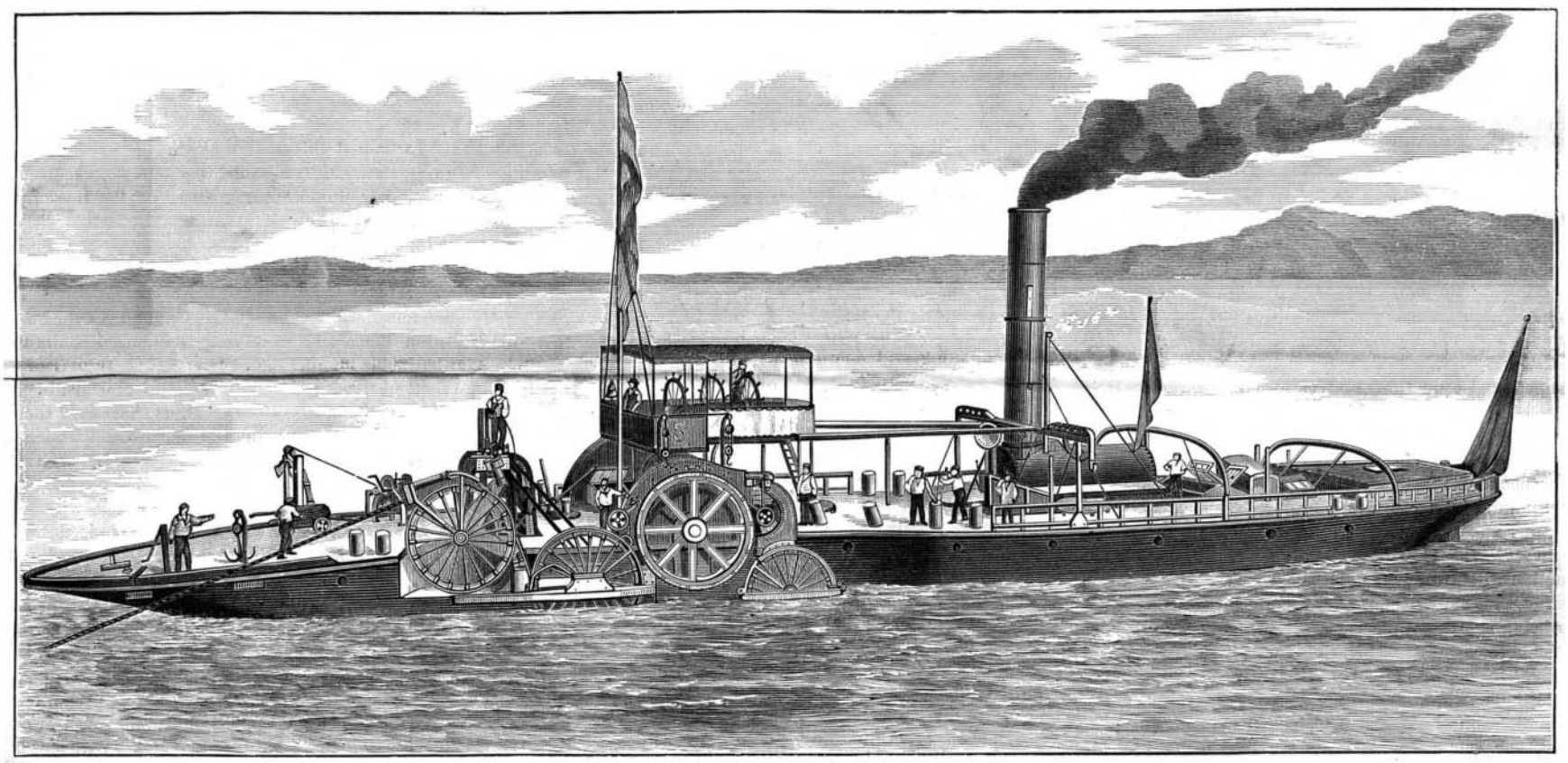
All the boats are fitted with twin screws, 1·2 meters (3 feet 11¼ inches) in diameter, these being used on the down-stream journey, and also for assisting in steering while passing awkward places during the journey up stream. They are also provided with water ballast tanks, and under ordinary circumstances they have a draught of 1·3 to 1·4 meters (4 feet 3 inches to 4 feet 7 inches), this draught being necessary to give proper immersion to the screws. When the water in the Rhine is very low, however, the water ballast is pumped out and the tugs are then run with a draught of one meter (3 feet 3⅜ inches), it being thus possible to keep them at work when all other towing steamers on the Rhine are stopped. This happened in the spring of 1882.

Referring to our engraving, it will be seen that the wire rope rising from the bed of the river passes first over a large guide pulley, the axis of which is carried by a substantial wrought iron swinging bracket, this bracket being so pivoted that while the pulley is free to swing into the line on which the rope is approached by the vessel, yet the rope on leaving the pulley is delivered in a line which is tangential to a second guide pulley placed further aft and at a lower level. This last named guide pulley does not swing, and from it the rope is delivered to the clip drum, over which it passes. From the clip drum the rope passes under a third guide pulley; this pulley swings on a bracket having a vertical axis. This third pulley projects down below the keel of the tug-boat, so that the rope on leaving it can pass under the vessel without fouling. Suitable recesses are formed in the side of the tug-boat to accommodate the swinging pulleys, while the bow of the boat is sloped downward nearly to the water-line, as shown, so as to allow of the rising part of the rope swinging over it if necessary.

The hauling gear with which the tug is fitted consists of a pair of condensing engines with cylinders 14·17 inches in diameter and 23·62 inches stroke, the crankshaft carrying a pinion which gears into a spur wheel on an intermediate shaft, this shaft again carrying a pinion which gears into a large spur wheel fixed on the shaft which carries the clip drum. In the arrangement of hauling gear above described the ratio of the gear is 1 : 8·44, in the case of tugs Nos. I. to IV.; while in tugs Nos. V. to VIII. the proportion has been made 1 : 11·82. In tugs I. to IV. the diameter of the clip drum is 2·743 meters (9 feet), while in the remaining tugs it is 3·056 meters (10 feet).

From some interesting data which have been placed at our disposal by Mr. Thomas Schwarz, the manager of the Central Actien-Gesellschaft für Tauerei und Schleppschifffahrt, we learn that in the tugs Nos. I. to IV. the hauling engine develops on an average 150 indicated horse, while in the tugs No. V. to VIII. the power developed averages 180 indicated horse power. The tugs forming the first named group haul on an average 2,200 tons of cargo, contained in four wooden barges, at a speed of 4½ kilometers (2·8 miles) per hour, against a stream running at the rate of 6½ kilometers (4·05 miles) per hour, while the tugs Nos. V. to VIII. will take a load of 2,600 tons of cargo in the same number of wooden barges at the same speed and against the same current. In iron barges, about one and a half times the quantity of useful load can be drawn by a slightly less expenditure of power.

The average consumption of coal per hour is, for tugs Nos. I. to IV., 5 cwt., and for tugs Nos. V. to VIII., 6 cwt.; and of this fuel a small fraction (about one-sixth) is consumed by the occasional working of the screw propellers at sharp bends. The fuel consumption of the wire rope tugs contrasts most favorably with that of the paddle and screw tugs employed on the Rhine, the best paddle tugs (with compound engines, patent wheels, etc.) burning three and a half times as much; the older paddle tugs (with low pressure non-compound engines), four and a half times as much; and the latest screw tugs, two and a half times as much coal as the wire rope tugs when doing the same work under the same circumstances. The screw tugs just mentioned have been in use since the beginning of 1876. The second rope between Bonn and Bingen, a length of 74¾ miles, is of galvanized wire, has now been 2¾ years in use, during which time there have been but three fractures. The first rope laid was not galvanized, and it suffered nine fractures during the first three years of its use. The first rope, we may mention, was laid in lengths of about a mile spliced together, while the present rope was supplied in long lengths of 7½ miles each, so that the number of splices is greatly reduced. According to the report of the company for the year 1880, the old rope when raised realizes about 16 per cent of its original value, and allowing for this it is calculated that an allowance of 18·7 per cent per annum will cover the cost of rope depreciation and renewals. Altogether the results obtained on the Rhine show that in a rapid stream the economic performances of wire rope tugs compare most favorably with those of either paddle or screw tug-boats, the more rapid the current to be contended against the greater being the advantage of the wire rope haulage.



WIRE ROPE TUG BOAT, RIVER RHINE.

During the years 1879, 1880, and 1881, the company had in use fourteen paddle tugs and ten eight-wire rope tugs, both classes being—owing to the state of trade—about equally short of work. The results of the working during these years were as follows:

Class of tugs.	Year.	Freight hauled in ton-miles.	Cost of haulage in pence per ton-mile.	Degree of occupation.
Paddle...	1879	31,862,858	0·1272	0 686
"	1880	31,467,422	0·1305	0·638
"	1881	28,627,049	0·1245	0·537
Wire rope.....	1879	15,407,935	0·1167	0·614
"	1880	17,289,706	0·1056	0·615
"	1881	17,593,181	0893	0536

The last column in the above tabular statement, headed "Degree of Occupation," may require some explanation. It is calculated on the assumption that a tug could do 3,000 hours of work per annum, and this is taken as the unit, the time of actual haulage being counted as full time, and of stoppages as half time. The expenses included in the statement of cost of haulage include all working expenses, repairs, general management, and depreciation. The accounts for 1882, which are not completely available at the time we are writing, show much better results than above recorded, there being a considerable reduction of cost, while the freight hauled amounted to a total of 54,921,965 ton-miles.

As regards the wear of the rope, we may state that the relaying of the first rope between St. Goar and Bingen was taken in hand in September, 1879, while that between Obercassel and Bingen was partially renewed the same year, the renewal being completed in May, 1880, after the rope had

Neglect of House Cisterns.

In his report on the London water supply during June Colonel F. Bolton says: "It appears to be the rule in building a certain class of houses to place the cistern over the water closet, with an untrapped waste pipe communicating with the drains. Cisterns and water butts are in many instances left open and regularly receive the drippings from the roofs and gutters, may be seen without lids, full of rank and decaying vegetation, which on closer examination would show more or less organic deposit, and under the microscope would be found to abound in infusorial life. They are often in close proximity to the dust bins and other deposits of filth and garbage, while children amuse themselves by throwing all sorts of dirty rubbish into the water. The purest water in England would be poisoned by such a system of storage. A remedy for this state of affairs will be found in the establishment of the constant supply and the consequent total abolition of the intermittent system; meanwhile, and until this constant supply is completed, the owners and occupiers of houses are highly culpable in permitting such a disgraceful condition of things to exist. In the better class of houses and in many public buildings the cleansing of cisterns and tanks—often placed in positions extremely difficult of access—is frequently neglected for months, and in some cases years are permitted to pass without any examination or cleansing taking place. All cisterns and other receptacles should be frequently cleaned out, and every care should be taken to prevent the contamination of the domestic supply after delivery.

Reappearance of the Great Comet of 1882.

It appears quite possible, says *Nature*, that as the moon draws away from the morning sky toward the end of the present month, this comet may be again observed with our larger instruments. Its distance from the earth has been increasing from soon after perihelion passage in September last, and a maximum takes place at the beginning of September next, when the distance is 5·988; the earth then for a time overtakes the comet, and the distance diminishes to 5·709 on December 1. The intensity of light, however, is greatest at the end of August, and the comet then rises at a sufficient interval before the sun to render observation feasible. It will at least be of much interest to ascertain if the comet can be reached with our most powerful telescopes. The only comet which has been hitherto observed under similar conditions is the celebrated one of 1811, which, it may be remembered, was observed by Wisniewsky at Neu-Tscherkask, in August, 1812.