EVOLUTION OF THE TOW BARGE.

BY JOHN R. SPEARS.

Although the incident received but the briefest notice in the daily papers, it is not unlikely that the sailing of the towing steamer "Col. E. L. Drake," with a 4,000-ton steel barge, loaded with petroleum, as a consort, for London recently, will, in future days, be considered one of the more important events in the history of the American merchant marine, for while tow barges and tugs as factors in the greater problems of water-borne commerce have never received any sort of consideration outside of the technical periodicals, they are now commanding the attention of the most enterprising merchants of two nations, the Americans and the Germans.

The unfortunate Fitch contemplated using steamers for towboats as early as 1786. Fulton went into freight and passenger traffic with his steamers, but it is a matter of record that many of the steamers built in the early days for freight and passengers were eventually used to tow sailing ships between the piers of New York and the open water off Sandy Hook. The first tug built as a tug was the "Rufus King," launched in 1825. The opening of the Erie Canal in the same year increased the demand for tugs because it was not possible for the canal boats to navigate the Hudson without them. In 1830 a company was formed to provide regular service for these boats, and from that day to this the long lines of canal boats astern of the slow-moving steamers have formed one of the most picturesque features of the Hudson. The long passage from Philadelphia to the Capes of the Delaware afforded another opportunity for the towboat man, and in 1836 a company was organized in Philadelphia for handling the business there.

But it was on the great lakes that the tug and the tow barge as inseparable consorts were first created. The need of tugs in the lakes trade was felt first, of course, in the passage of the Detroit and Huron rivers. Old sailors tell about spending two weeks trying to beat their way against the current from Erie to Huron, but before the civil war the towboat men had captured nearly all the up-traffic and they failed to tie in the down-bound vessels only when there was a fair wind that would drive a schooner ten knots an hour down the current.

The channel between these two lakes was narrow and crooked, and in places sheal. Such work as was found there tested the economy as well as the power of the tug to the utmost. Naturally the owners learned to build the best quality of towboats and to keep careful accounts of the actual cost of towing the various kinds of vessels used on the lakes. And after a time it was learned from these accounts that the use of a tug might be extended with profit from port to port.

In the days before and just after the civil war, Saginaw Bay was a very great lumber-producing district. Buffalo and Tonawanda, at the head of the Erie Canal, afforded the chief markets for this lumber, and it was in the trade between Saginaw and Niagara River that tow barges were first regularly used. But there is a conflict of authority as to the name of the man who first went into the tow-barge business. According to one authority Mr. John S. Noyes was the pioneer. The building of the Lake Shore Railroad having deprived a number of vessels of business, Mr. Noyes transformed two of them, the "Empire" and the "Sultana," into barges. They were put in tow of the tug "Reindeer" with such success that a third barge was added to the string. Mr. Noyes began this business in 1861. The friends of the late J. R. Van Vleck, of Tonawanda, claim for him the honor of first towing barges of lumber from Michigan ports to market, and he was certainly one of the pioneers. It is asserted that he brought his first barge loaded with lumber to Tonawanda in 1860.

From towing lumber to towing grain-laden vessels the transition was easily made, and the first grain thus brought to Buffalo was in the barge "Adams," in tow of the steamer "Graves." The "Graves" had been a schooner, but engines were put into her. It is to be observed that in the barge business before this voyage the towing had been done by tugs carrying no cargo.

From the lakes the tow-barge system eventually came to the Atlantic coast, where it was found at first to be particularly well adapted to carrying coal to ports along Long Island Sound and as far east as Providence. Schooners had had a monopoly of the coastwise coal trade, but a tug and barges could deliver the cargo much more promptly. Then they were found more economical, especially for small cargoes. Thus, where a schooner would require a crew of six or eight men a tow barge of equal capacity required but three or four. Some good-sized barges got on with two men, and they were men who received relatively small pay. The tug had a high-priced crew, but it took a dozen barges in tow and left them at the different ports alongshore, and while they were discharging cargo it came back for more, bringing along the empty barges towed out on the previous voyage.

Then the towboat men of the coast reached out for the long-distance coal trade. They built powerful tugs and bought old ships from which the masts were taken. Capacities of a thousand tons and upward were thus provided for, and with a string of from two to four of these big barges the tug was found able to take coal from Philadelphia and Newport News as far east as Boston and Portland.

So much money was made in this way that the more enterprising of the owners in the business began building barges especially for the trade, and then still greater profits were made, although the new barge cost more than the transformed sailing ship. Barges of 3,500 tons and upward were built. Necessarily tugs of the most powerful description were built to handle the barges. The "W. E. Luckenbach" is a fair sample of the high-seas tugs. She is 154 feet long, measures 454 tons gross, and has engines of 1,100 horsepower. She can tow three loaded barges from Newport News to New York in forty-eight hours. The tug "Cuba" is 165 feet long and tows three barges, each of 3,000 tons capacity, from Newport News to points east of Cape Cod.

When the tow barges had demonstrated their superiority (only the largest schooners, and those in the longest-distance traffic are now able to hold their own with the barges), oil in large quantities was discovered near the coast in Texas, and in due time barges were tried in the transportation of this oil to New York. Before this time a Dutch tug had towed an Italian vessel from Philadelphia to Genoa, crossing the ocean in seventeen days. The huge lifting dock which the Spaniards installed at Havana before Cuba was freed was towed out from England. The success of such towing ventures as these encouraged the belief that barges might enter the trade over a route as long as that from the coast of Texas to New York harbor, and when a voyage was made on a venture it proved profitable. The barge is now a regular feature of the Texas-New York trade.

After the Texas trade was established there came a sudden demand for oil, and for an oil barge and consort, on the Pacific coast. The tow steamer "Atlas" and a barge of 6,000 tons capacity, known simply as "No. 93," were sent on the trip, 13,000 miles long, and on February 26 of the present year they arrived safely in San Francisco. The log of the trip shows that the cargo was carried more cheaply than it could have been carried by a regular steamer.

The next step forward was the entrance of the barge into the transatlantic trade. Heretofore the barge had succeeded only in the coastwise trade and in such West India voyages as that to Havana, and there were reasons for supposing that an over-sea voyage would not prove profitable. For one thing, the insurance people had, for a long time, looked upon such a trip as extra hazardous. But when a barge had made the voyage through the stormy Straits of Magellan there was no longer any reason for calling any over-sea voyage of a well-built barge extra hazardous, and the only point necessary to consider was the relative cost of barge and tramp-steamer transportation. Figures made in advance had shown a profit for the barge, and on July 3 the first barge-traffic voyage across the Atlantic was begun.

Although the towing steamer carried a cargo and towed another astern of her she attained the speed of an ordinary cargo steamer and her consumption of coal was by no means equal to that of two steamers carrying as much cargo as she and her consort carried together. There was no loss of time in the passage and there was an economy of coal in thus carrying two cargoes across the ocean. At the same time the cost of the crew of the barge was far less than that of a steamer of equal capacity.

It is interesting to note that the "Drake" and her consort were fitted with wireless telegraph instruments so that in case the six-inch hawser should break communication would not be interrupted, and though they might become separated by many miles of water the steamer could easily find the barge.

While a single successful voyage does not establish a regular trade necessarily, it goes a long way toward doing so in a case like this. For it is to be noted that now and for a year past ocean traffic has been greatly depressed. Many ships have failed to make running expenses. When a system of transportation proves profitable under such conditions there is no doubt about its merits.

And to show further the confidence that towboat men have in their system, a news item from Germany may be quoted. A German company has been distributing coal around the Baltic, for some years, by means of barges. While the "E. L. Drake" and consort were crossing the Atlantic this German company took a contract to load five towing steamers and nine barges with railway material that is to be delivered in the Yenisei River, Siberia; and that is to say that these tow-barge voyages are to be made through the Arctic Ocean along the whole north coast of Europe and for twenty degrees of longitude along the north coast of Asia. If to this statement be added the further fact that Pacific coast lumbermen are preparing to tow a huge raft of timber from Seattle to Shanghai it will be seen that the tug and the tow barge are likely to become most important factors in the freight traffic of the high seas.

SCIENCE NOTES.

An interesting archæological discovery was recentiy made at Leagrave, near Luton (England) by the unearthing of two skeletons, estimated to be quite 2,000 years old. Beside the bones were also found a quantity of bronze ornaments. The skeletons are believed to be the remains of two females, dating back to late Celtic times, since the mode of burial was typical of that period. Both bodies were in a doubled-up position with heads to the west. Some of the bones were in a remarkably good state of preservation, especially the skull and teeth, although much discolored by contact with the earth. The bodies were found fifteen feet apart.

News has been received from Major Powell Cotton, who set out last year on an African expedition from the Nile to the Zambesi. During his travels he has gathered interesting information concerning the methods adopted by the natives of the innermost regions of the Congo Free State for the disposal of their aged members when they become a burden. The infirm and aged people are rendered unconscious by means of a narcotic, and in this comatose condition are wrapped in a fresh antelope skin. In this garb they are then hurried by the members of the family to a point remote from the village, and abandoned in the grass near a native track. The first native that passes the spot discovers what he imagines to be an antelope, and promptly dispatches it with a spear. The members of the deceased aged one's family then emerge from hiding near by, and express open horror and surprise at the unfortunate incident, though inwardly congratulating themselves upon the successful manner in which they have been relieved of their burden. When last heard of, Major Powell Cotton had left for the Stanley forest.

Dr. H. Maché, a prominent physicist of Vienna, has recently made some determinations upon the radioactive properties of mineral springs. Experimenting upon the gases, water, and solid deposits of the Gastein springs, he finds that they show the active effect which is characteristic of radium. In this case the water has a greater active power than the solid portions. It is observed that the quantity of emanation varies from one spring to another and also that there is no direct relation between the quantity and the temperature. He considers, however, that the cold springs have a tendency to be radio-active in a greater degree. To explain the differences of activity which are found in these cases, he advances the idea that the water of different springs has taken a greater or less amount of time to come from below to the surface of the ground, and this would have an effect upon the amount of emanation which they carried. He also admits the possibility that the north-and-south direction of the fissures from which the water flows would favor its richness in emanation. Dr. Maché also observed the radio-activity of the mud deposits of the Gastein springs, and found in it a mineral containing manganese which is known in Germany as Reissächerite, and is characteristic of the Gastein region. The mineral is somewhat active, being from 0.05 to 3.9 times as active as uranium nitrate, without containing any uranium salt. It is the second example of a radio-active mineral which does not contain uranium.

A new method of detecting the presence of rhodium has been brought out in a paper which P. Alvarez presented to the Academie des Sciences. He finds that the blue liquid which is obtained along with the green precipitate of ortho-rhodic hydrate, $Rh(OH)_3$, in oxidizing directly an alkaline solution of a rhodium salt by chlorine or a hypochlorite can be of considerable value in finding whether rhodium exists in a given compound. The reaction can be easily carried out as follows: An aqueous solution of a rhodium salt such as chloro-rhodate of sodium, $Rh Cl_3, 3 Cl Na = Rh Cl_6 Na_3$, is added to an excess of soda Na OH in order to obtain an alkaline solution of sesquihydrate of rhodium, $Rh(OH)_3, H_2O$. Then we act upon the liquid by a gas. The latter comes from the action of concentrated hydrochloric acid upon potassium chlorate and is brought into the test solution by a narrow tube. In this case the alkaline solution, which is very dilute and almost colorless, takes a yellowish-red color which changes at once to red. Then the red color becomes more and more intense, and the moment arrives when the gas continues to act, when the liquid begins to cloud and forms a slight green precipitate. The latter dissolves finally in the liquid to a fine blue color, which resembles that of an ammoniacal copper solution. In sulphurous liquid or gas the solution loses its blue color and becomes yellow owing to the formation of rhodic sulphate. This reaction will be of use in distinguishing rhodium from the other metals of the same group.