

Lake Transportation.

THE DEVELOPMENT OF TRANSPORTATION ON THE GREAT LAKES.

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The commercial chronicle of the United States records no more remarkable evolution than the development of transportation on the Great Lakes, extending as it does over little more than half a century, yet characterized by a series of radical innovations in the types of craft employed.

During the latter part of the last century the whole tendency on the Great Lakes, as in the realm of salt-water shipping, was toward a gradual increase in the size of vessels. The extent of this progression is evidenced by the fact that in the ten years from 1890 to 1900 the standard type of freight-carrying steamer increased from approximately

300 feet in length to a length of 500 feet, while the dead-weight carrying capacity was extended from 2,500 to 7,000 gross tons. In other words, the steel steamer "Matoa," which at the opening of the final decade of the century was the largest freighter in service, was 290 feet in length, 40 feet beam and 21 feet depth, whereas the steamer "John W. Gates," the vessel which upon her completion in 1900 marked the attainment of the maximum size in lake cargo carriers, is 498 feet in length, 52 feet beam and 30 feet molded depth.

Of late, however, there has been a change of ideas as to the best size for lake cargo carriers. The construction of freighters, 500 feet in length, was abandoned and there was a return to the vessel of more moderate size. Few, if any, of the vessels added to the lake fleet during the past year or two have exceeded 450 feet in length, and a considerable number of the new ships are under 400 feet in length.

The reason for this unexpected change of policy is found in the navigation conditions on the Great Lakes. The 500-foot ship was planned in the day when a channel twenty feet in depth throughout the entire length of the lakes was regarded as a certainty of the immediate future; and when shipbuilders and owners realized that they could not hope, for a long time to come, for more than eighteen feet depth of water under the most favorable conditions, they

began to build smaller vessels. The largest of the later vessels are 436 feet in length over all, 50 feet beam and 28 feet depth. A steamer of this size has, on a draught of 18 feet, a carrying capacity of approximately 6,200 gross tons and costs complete \$260,000. Another class of freighters is made up of 400-foot vessels of the same beam and

depth as the carrier previously described. The reduction in length reduces the carrying capacity to 5,600 tons, but each hull entails for construction an outlay of \$20,000 less than that mentioned as the cost of the vessel 436 feet in length.

Unfortunately, it has never been found possible to accurately measure the entire water-borne commerce of the Great Lakes, but the statistics compiled by the United States government officials at the Sault Ste.

Marie Canal—the water gateway connecting Lakes Huron and Superior, through which passes perhaps half of the commerce of the unsalted seas—indicate how rapid has been its growth. In the year 1881 the total amount of freight passing the Sault was 1,567,741 tons; in 1891 it was 8,888,759 tons; and in 1901, the last calendar year for which statistics are available, the aggregate was 28,403,065 tons. In other words, the traffic in 1901 was more than three times that a decade before and eighteen times that a score of years since.

Passenger travel on the Great Lakes has also experienced remarkable growth. There are connecting lines of fast passenger steamers between the principal cities, such as Buffalo and Cleveland, Buffalo and Detroit, Cleveland and Detroit, and Chicago and Milwaukee, and also there are in service exclusively passenger steamers which make regular through trips between Buffalo and Chicago. The Sault Ste. Marie statistics, which recorded the passage through the canals during the season of 1901 of upward of 60,000 passengers, chronicle, of course, but a fraction of the whole passenger travel, and it is estimated that the passenger steamers of the vast inland waterway carry annually between a quarter of a million and one-third of a mil-

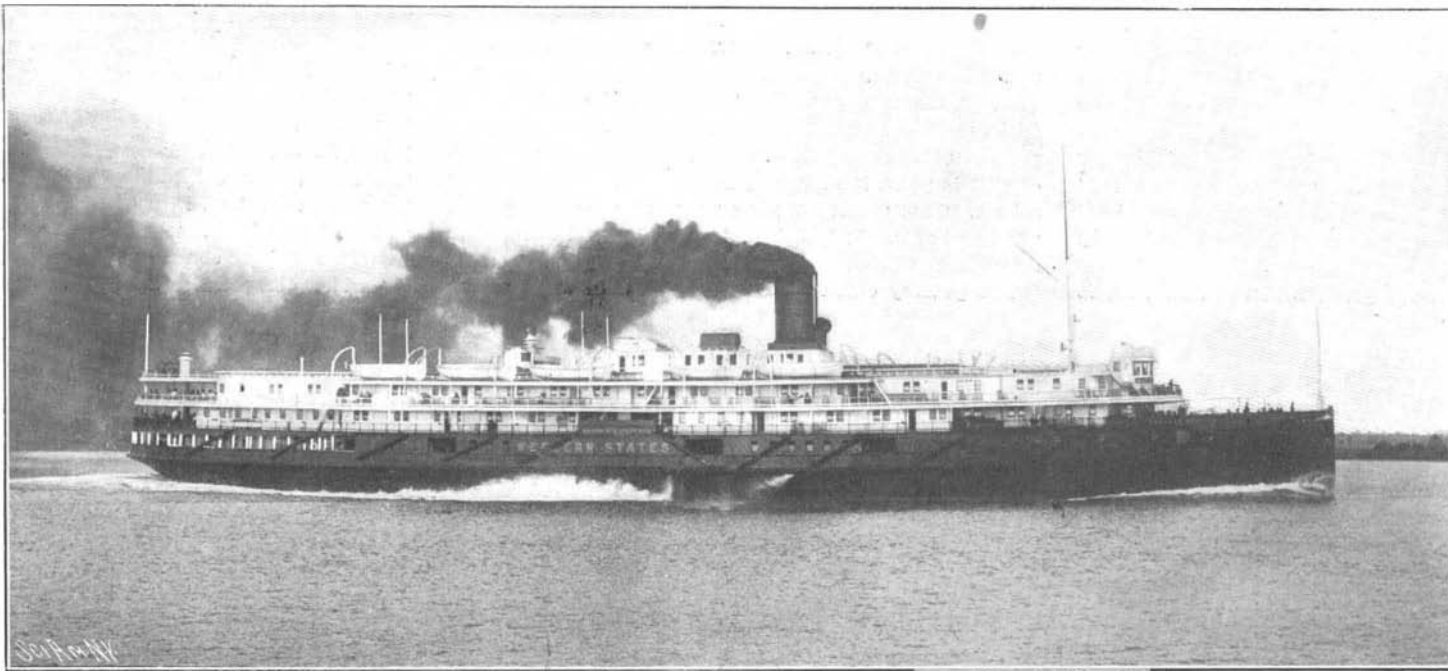
lion people. The side wheel steamer is still favored for passenger service on the lakes. Some years since there were constructed at Cleveland two very large and magnificent steel passenger steamers of the ordinary propeller type, which are in many respects counterparts of the best modern ocean liners, and these vessels now carry annually about 20,000 passengers between Buffalo and Chicago; but the innovation in design was not generally adopted by lake navigation interests. Indeed, there have been completed during the past year the two largest side-wheel steamers ever constructed for fresh-water service. These vessels are the steamers "Eastern States" and "Western States," and they are now in daily service between Buffalo and Detroit. Each is 366 feet in length, 55 feet in beam and 19½ feet deep. Each vessel is driven by inclined, three-cylinder, compound engines, to which steam is supplied

from eight boilers, and this machinery is designed to enable the vessel to make the run of 256 miles from Detroit to Buffalo in twelve hours under almost any weather conditions. Each of these steamers represents an investment of about \$640,000.

An interesting demonstration of the sustained speed of the typical side-wheel steamer in lake service was made upon the occasion of the memorable race on Lake Erie something over a year ago, in which test of speed the steamer "City of Erie" defeated the "Tashmoo," another side-wheeler, by the narrow margin of 45 seconds in a run of one hundred miles. It may be noted for purposes of comparison that both vessels are of the same length. The "Erie" has a displacement of 2,000 tons as against 1,200 tons in the case of the "Tashmoo," but counterbalancing this inequality is the fact that the winner has engines of 6,000 horse power as compared with machinery of 2,800 horse power possessed by the "Tashmoo." The "City of Erie," which by reason of her achievement upon this occasion is claimed to be the speediest passenger steamer on the Great Lakes, attained a record speed of 22.93 miles per hour.

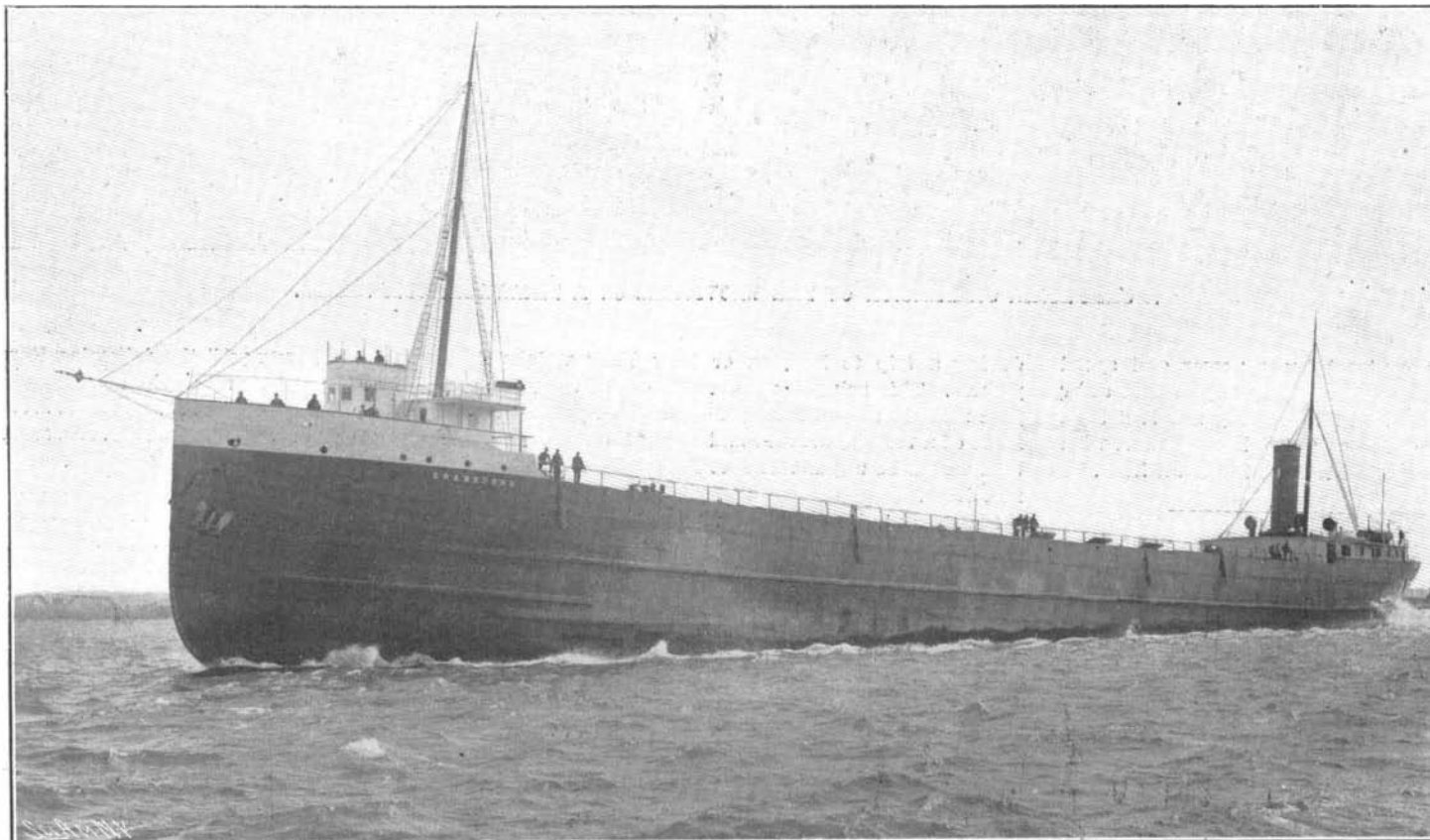
The growth of steel shipbuilding on the Great Lakes has, of course, more than kept pace with the expansion of the fresh-water fleet. In the spring of 1899 the seven or eight principal shipbuilding corporations on fresh water, including the largest plants where steel

tonnage is constructed, were merged into a combination known as the American Shipbuilding Company. Five of the plants were put in at valuations close to or exceeding \$1,000,000 each and the lowest was \$750,000. The consolidation gave the company control of eleven of the leading drydocks on the lakes, for, as on the Atlantic coast, each yard of any size has one or two



Length over all, 386 feet; breadth, 44 feet; depth, 26 feet; tonnage, 5,000; horse power, 8,000; draught, 16 feet 8 inches; speed, 22 miles an hour.

"WESTERN STATES," ONE OF THE LATEST OF THE LAKE PASSENGER STEAMERS.



Length, 414 feet; beam, 50 feet; draught, 18 feet; tonnage, 3,955 net; speed, 12 miles an hour.

TYPICAL LAKE FREIGHT STEAMER "BRANSFORD."

drydocks connected therewith.

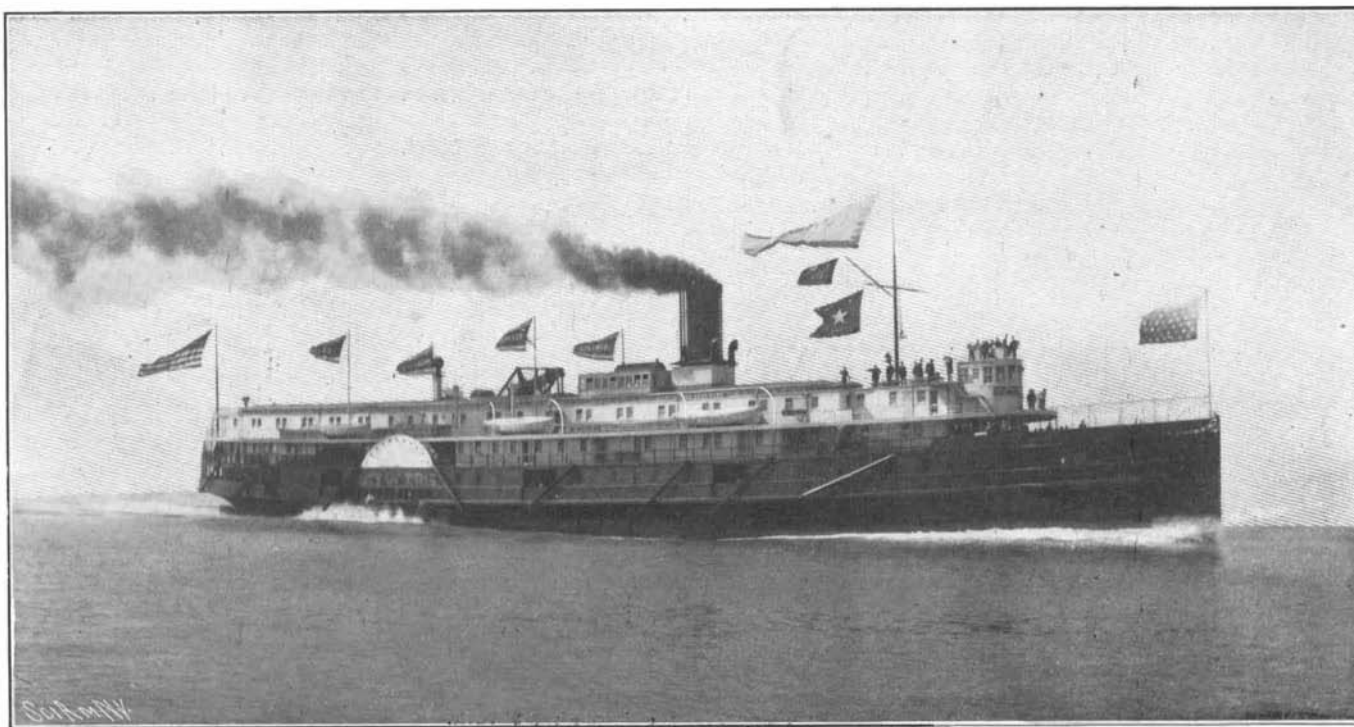
The plants and property of this particularly interesting combination or "trust," located at Detroit, Lorain, Cleveland, Bay City, Mich., Chicago, West Superior, Wis., and Buffalo, are now estimated to be worth more than \$15,000,000. During the fiscal year ending June 30, 1902, the corporation built at its several plants forty-one vessels having an aggregate of 198,500 net tons capacity on 18 feet draught, while there were yet under construction and uncompleted on that

date thirty vessels of 135,000 tons aggregate carrying capacity. At the time of its formation the combination above mentioned absorbed all the leading steel shipbuilding institutions on the lakes; but so rapid has been the growth of independent plants since that time, that these individual establishments now have in the aggregate a building capacity equal to upward of one-half of that of the consolidated shipyards.

A most interesting phase of the development of transportation and kindred activities on the Great Lakes is found in the increasing degree of attention given by the powerful steel-vessel building interests of the interior to the construction of steamers designed for salt-water traffic or for both lake and ocean service. Vessels of this type are proving particularly profitable to their operators by reason of the fact that they may be transferred to the Atlantic coasting trade during the winter months, when navigation on the lakes is impossible. In order to pass through the Welland and St. Lawrence canals, a vessel must not exceed 270 feet in length, and the carrying capacity of such a craft is approximately 3,000 tons. It may be noted in passing that the season of navigation on the lakes has been lengthened materially of late years. Many vessels are put in service earlier than formerly, and with the gradual disappearance of the old craft has come a disposition to have the carriers brave the elements until late in the autumn.

THE DEVELOPMENT OF THE AUXILIARY YACHT.

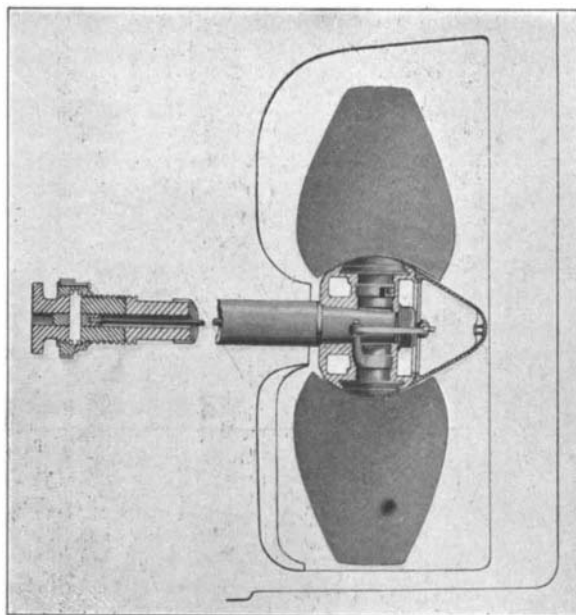
Your true sailorman, with his inborn love of the sea, always looks askance at a yacht that depends for its motive power upon anything more than well-trimmed sails and nature's own motive power, the wind. To him it is the very fickleness of the breezes, the uncertainty of the tides, currents, and various elements that go to render navigation difficult, that constitute half of the charm of yachting, for is it not in the careful observation of these, and in the accumulated experience of many seasons' cruising in foul weather and fair, that he develops that confidence, resourcefulness, forethought and presence of mind that go to make up the successful yachtsman? On the other hand, in this busy, workaday age, when we are in such a hurry to accumulate our store, big or little, as the case may be, of this world's wealth, we have come to begrudge even the all-too-brief hours that we give to recreation; and the long delays which are inevitable on a sailing yacht through failing winds, or foul tides, have led to the experiment of introducing a limited



Tonnage, 2,000; speed, 22.7 miles an hour.

"CITY OF ERIE," THE FASTEST STEAMER ON THE LAKES.

amount of steam or other mechanical motive power on sailing yachts. The great convenience of being able to continue on one's course in calm weather at from one-half to two-thirds the ship's sailing speed.

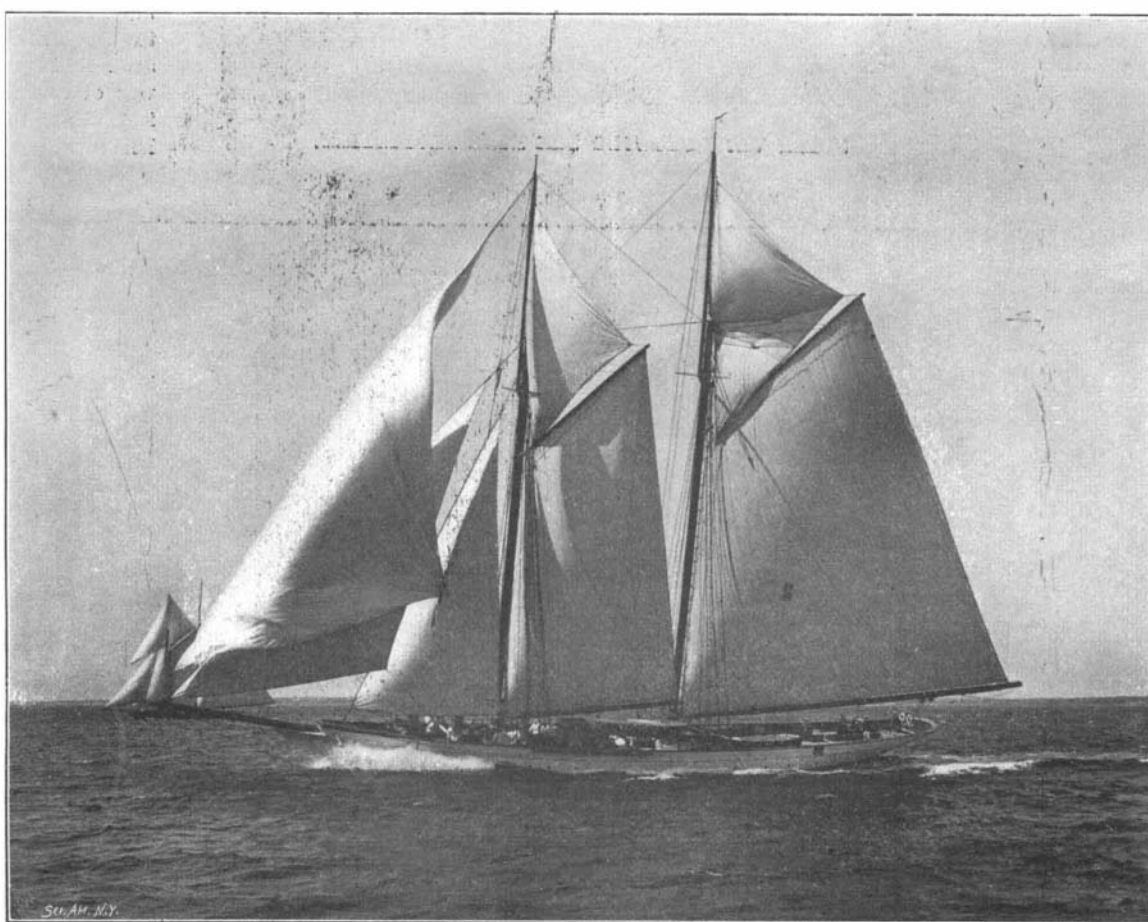


Feathering Propeller of the "Ariadne," With the Blades Thrown Parallel with the Keel for Sailing.

ary cruisers which have recently been built in this country for American yacht owners. The "Ariadne," which is from designs by Tams, Lemoine & Crane, is a steel vessel 110 feet in length on the water line, 131 feet over all, with 26 feet beam, a molded depth of 19 feet and a draft of 14 feet. Her sail plan is such as would be given to a large cruising schooner of the ordinary type, and in her cruises with the New York Yacht Club this summer she has shown that in a strong reaching breeze she is capable of overhauling and passing such fast racing schooners as the "Muriel" and "Elmina." In addition to her ample sail plan, she carries a compound engine with cylinders 9 inches and 19 inches in diameter, with a stroke of 14 inches. Steam is provided by an Almy water-tube boiler with 17 square feet of grate surface; and under steam alone she is capable of a speed of 8 knots an hour, or say two-thirds of her sailing speed under favorable conditions.

The accommodations of the "Ariadne" include five staterooms, three bathrooms and a main saloon for the owner, and five staterooms, a messroom, and a bathroom for the officers, besides twelve swinging berths in a large forecabin for the crew. The main saloon is located just forward of the mainmast, while adjoining it and extending aft is the owner's 12 by 12 stateroom, and a connecting bathroom. The headroom throughout is 7 feet 6 inches. The engine space, the coal bunkers, with a capacity of 23 tons, the galley, pantry, and the working end of the vessel are forward of the main saloon. She has water tanks with a capacity of 3,500 gallons, and ice-boxes capable of holding four tons of ice. She is also furnished with an electric light plant, an evaporator, a distiller, and a complete system of steam heating.

Of course, the placing on board of boiler, engine, coal bunkers, and a screw propeller was done with a sacrifice of some sailing speed when the vessel is under canvas; but the sacrifice is not large considering the great convenience secured in cruising, the estimated difference being from a knot to a knot and a quarter per hour. One of the most difficult problems to solve in a vessel of this type is that of reducing the resistance offered by the propeller, owing to its drag upon the water when the vessel is under sail alone. From the time when auxiliary power was first introduced on sailing vessels, various expedients have been resorted to in the endeavor to reduce this drag, such as allowing the propeller to revolve idly, or providing a well at the stern through which it could be uncoupled and lifted clear of



Length over all, 131 feet; waterline length, 110 feet; beam, 26 feet; depth, 19 feet; draft, 14 feet. Compound engine: High pressure, 9 inches; low pressure, 19 inches; stroke, 14 inches.

THE AUXILIARY SCHOONER YACHT "ARIADNE" MAKING 12 KNOTS UNDER SAIL ALONE. SPEED UNDER STEAM, 8 KNOTS.