

drydocks connected therewith.

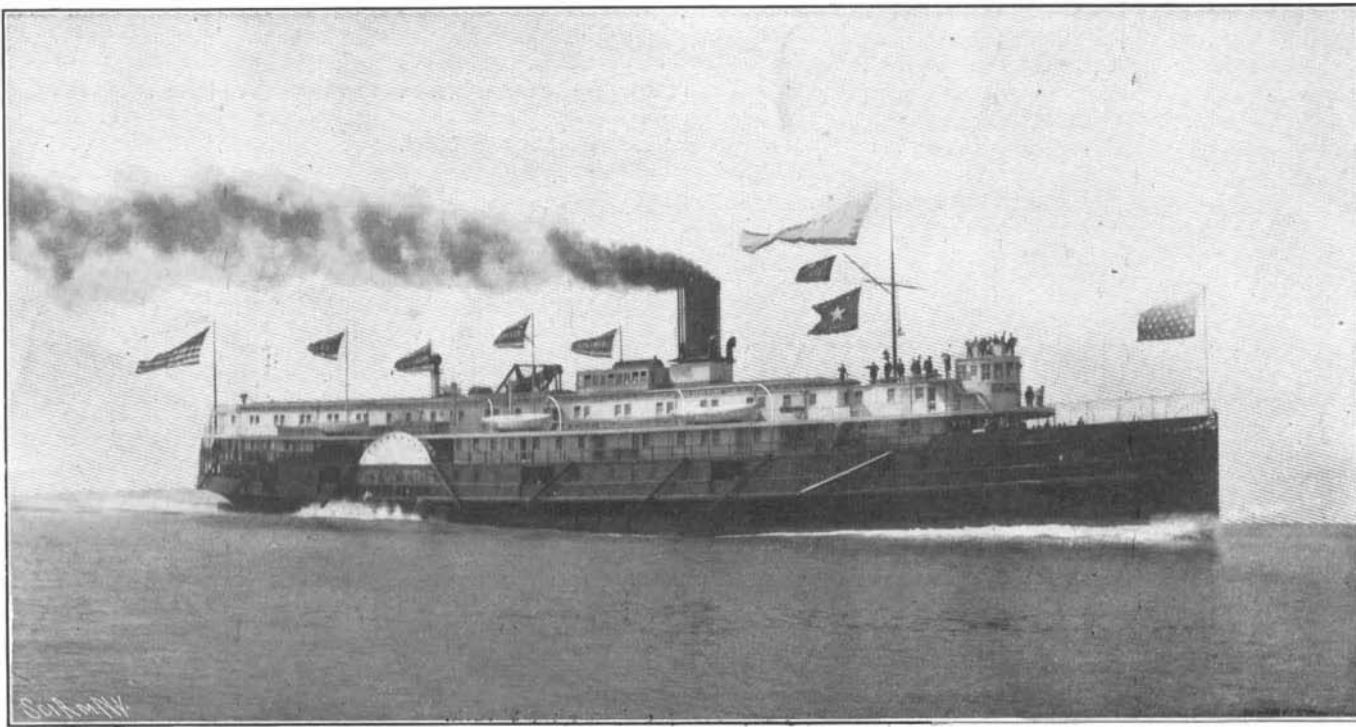
The plants and property of this particularly interesting combination or "trust," located at Detroit, Lorain, Cleveland, Bay City, Mich., Chicago, West Superior, Wis., and Buffalo, are now estimated to be worth more than \$15,000,000. During the fiscal year ending June 30, 1902, the corporation built 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.

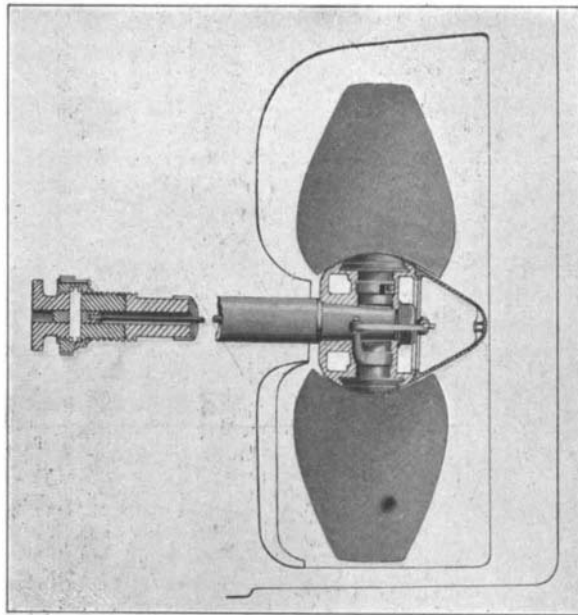
Your true sailorman, with his inborn love of the sea, always looks askance at a yacht that depends for its motive power upon anything more than well-trimmed sails and nature's own motive power, the wind. To him it is the very fickleness of the breezes, the uncertainty of the tides, currents, and various 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.

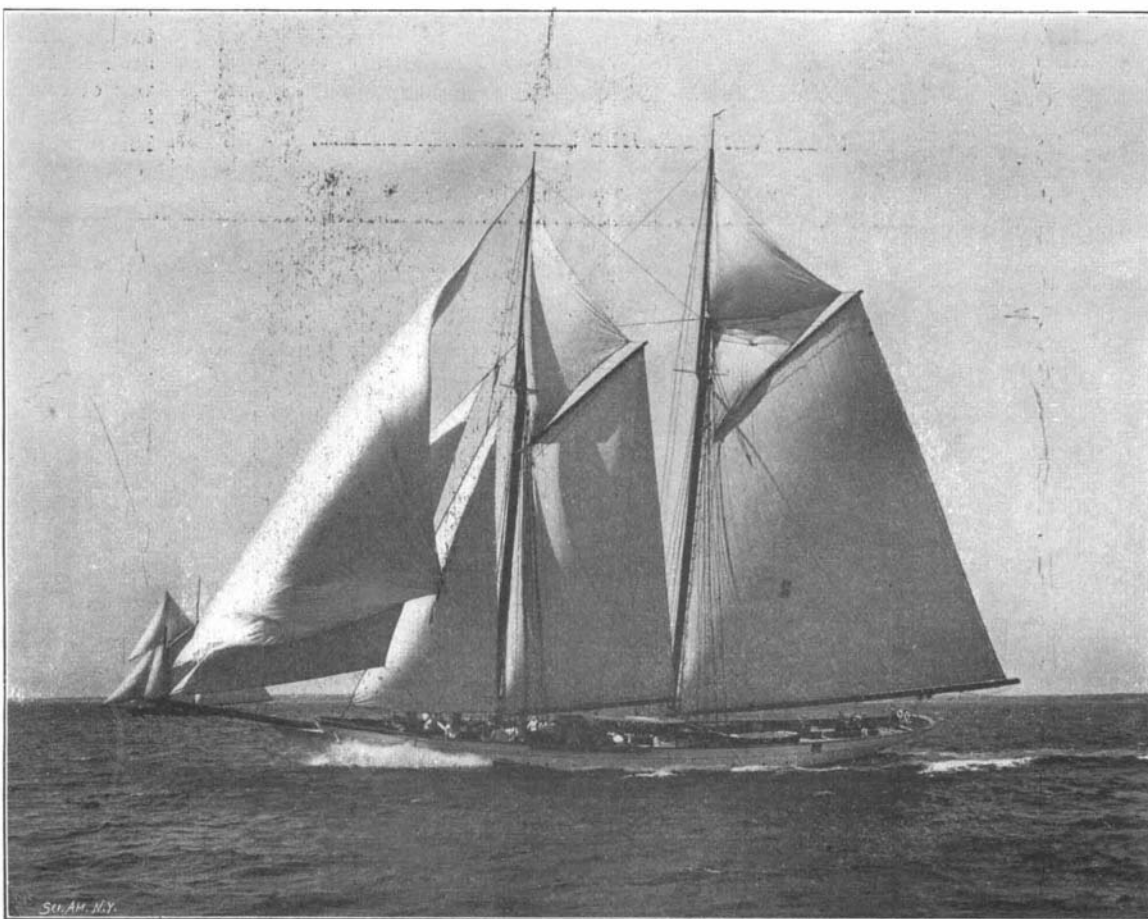


Feathering Propeller of the "Ariadne," With the Blades Thrown Parallel with the Keel for Sailing.

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.

the water. The method adopted on the "Ariadne," of which we present a detailed drawing, is one that was designed and patented in 1868 by Mr. R. R. Bevis, a former manager of Messrs. Laird's building establishment in Great Britain. This type was fitted by that firm to several auxiliary cruisers in the British navy, among which was the corvette "Calliope," which it will be remembered, was present at the terrific hurricane at Apia in the Samoan Islands, when so many American vessels were lost, and barely managed to steam out against the hurricane into deep water. The object of the device is to enable the

angle of the blades of a propeller to be altered, while they are in place under water, to the pitch most suitable for working with steam under varying circumstances, as well as to feather them in a fore-and-aft direction when the vessel is under sail, and the steam power is not in use. The propeller blades are rotatable on their axes, and they are moved by a pair of levers which are attached to a yoke at the outboard end of a rod that passes entirely through the propeller shaft into the engine room. Here the interior rod is coupled by means of a pin, sliding in a slot cut through the propeller shaft, to an outer, threaded sleeve, which is capable of fore-and-aft movement on the propeller shaft by means of a thread cut on the shaft. This sleeve is formed with a pinion on its outer periphery which is engaged by a spur wheel that can be operated by hand. To feather the blades, that is, to place them with their surfaces approximately parallel with the keel of the ship, the sleeve is moved forward into the position shown in our drawing. When it is desired to use steam power, the sleeve is screwed back upon the propeller shaft, forcing the interior rod to the rear, and by means of the connecting levers swinging the propeller blades around to the proper angle of pitch. The connecting levers, arms, etc., are entirely inclosed with the hollow boss of the propeller, and it will be seen that when the blades are in the fore-and-aft position, the drag or friction of the propeller is reduced to a minimum.

ENGLISH TURBINE-PROPELLED YACHTS.

BY THE LONDON CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

Of the three high-speed yachts to be fitted with the Parsons marine steam turbine, two have up to the present been launched. They are the "Tarantula," owned by Col. H. McCalmont, M. P., and the "Emerald," belonging to Sir Christopher Furness, M. P. The "Tarantula" is of very special design, having been built on the lines customary to all vessels of the torpedo-boat class. As regards the hull and boilers the "Tarantula" is in fact identical with all first-class torpedo-boats. The boiler is of the Yarrow water-tube type. She is driven by three turbines, one high-pres-

sure and two low-pressure. The high-pressure turbine is placed on the central shaft and the two low-pressure turbines on the two outer shafts. There are thus three propeller shafts in all and three screws on each shaft, making nine screws in all.

The "Tarantula" is 160 feet long and 16 feet beam.

Her designed speed was 24 knots and her horse power is estimated as a little over 2,500.

The "Emerald" will displace 756 tons and her indicated horse power is expected to be about 1,500. The propelling machinery consists of three sets of steam turbines, each driving one length of shafting—one central and two side shafts—one propeller of about 3 feet diameter being attached to the center, and two propellers, each of about 20 inches diameter, to each of the side propeller shafts. All the propellers of the "Emerald" are of manganese bronze. The hull has been specially strengthened to prevent any vibration in the structure from the great speed at which the shafts will revolve. Her over-all length is about 236 feet, beam 28 feet 8 inches and molded depth 18 feet 6 inches, giving a tonnage of about 756 tons yacht measurement, and her speed will be 16 knots. At her launching her owner, Sir Christopher Furness, remarked that about all the Hon. C. A. Parsons, Messrs. Stephen and himself had in view in fitting the "Emerald" with turbines was to put into the vessel such power as would enable her to steam at the highest rate compatible with entire freedom from vibration. He believed that object would be attained and, still further, he believed as a business man, and as one engaged with ships and shipping, that the steam turbine would practically revolutionize yachting and yacht owning in the United Kingdom.

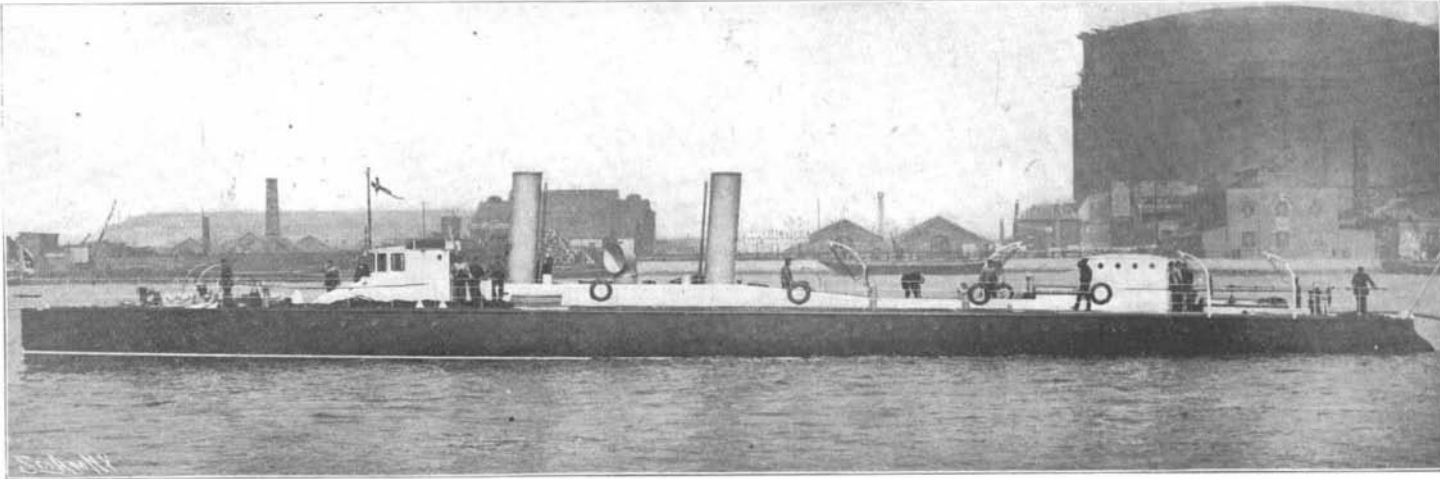
The third yacht, the "Lorene," is being built to the order of Mr. A. L. Barber, of New York. She will displace about 1,400 tons and she will be 260 feet 8 inches long and 33 feet 3 inches beam. The hull and boilers are being constructed by Messrs. Ramage & Ferguson, of Leith, Scotland, and her turbine machinery will come from the Parsons Marine Steam Turbine Company. Mr. Barber's yacht is expected to be launched shortly.

THE APPLICATION OF TURBINE PROPULSION TO PASSENGER VESSELS.

BY HERBERT C. FYFE.

Up to the present moment there have been built eight vessels that have been fitted with the Parsons marine steam turbine, while five are now in process of construction. The first was of course the little "Turbinia," launched in 1896 and in her day the fastest vessel afloat, her maximum horse power being 2,300 and

speed 34½ knots. Next came H. M. S. "Viper," whose maximum speed was 39.113 knots or nearly 43 statute miles, the horse power being 12,300; and H. M. S. "Cobra," whose maximum was 35.6 knots. The "Viper" was lost during the British naval maneuvers in the summer of 1901, owing to her striking a rock in a thick fog, while the "Cobra" went down off the outer Dowsing Shoal while on her way from the Tyne to Portsmouth on the 1st of Sep-

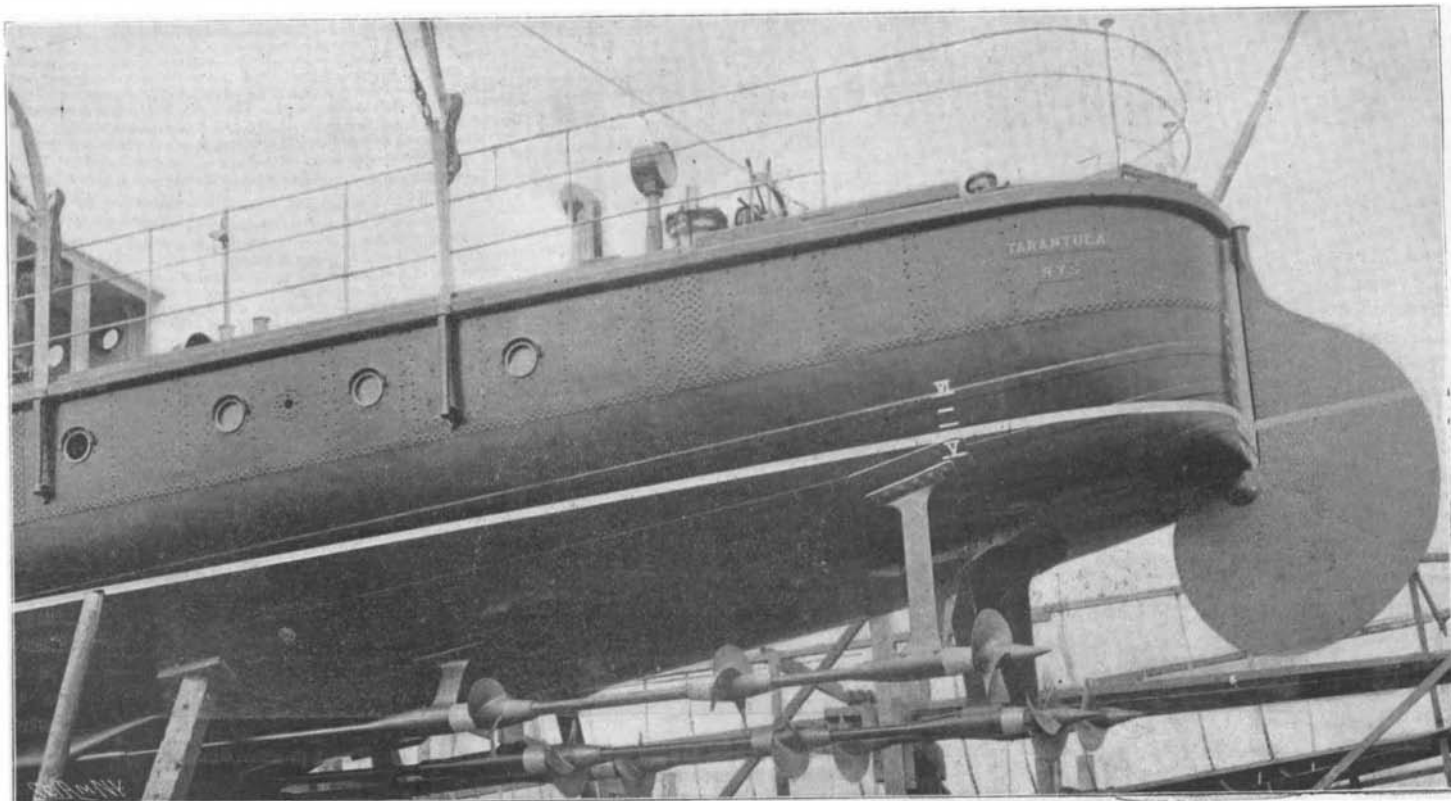


Length, 160 feet; beam, 16 feet; designed speed, 24 knots.

ENGLISH TURBINE YACHT "TARANTULA."



STERN VIEW SHOWING THE NINE PROPELLERS.



VIEW OF PROPELLERS, SHAFTING AND BRACKETS OF "TARANTULA."