

MARINE STEAM TURBINES.

BY FRANK C. PERKINS.

As a result of the experience gained with the turbo-motored steamers "King Edward," "Queen Alexandra," and various other craft equipped with steam turbines, there is little reason to doubt that from now on this class of engine will be extensively used in the marine service.

The largest turbo-motored steamer afloat, the "Queen Alexandra," has recently been launched at the Leven Shipyard, at Dumbarton, England. It is a replica of the "King Edward," although larger, and was built by the same firm, Messrs. William Denny & Brothers, for passenger service on the Clyde. The "Queen Alexandra" is constructed very similarly to the older vessel, but has much larger dimensions, being 270 feet long, 32 feet in breadth and with a depth to promenade deck 18 feet 9 inches. This turbine steamer strongly resembles a small cross-channel steamer. There is no question but the appearance of the new vessel will be watched with great interest, as no less an authority than Capt. Williamson has declared himself in favor of the steam turbine for vessel propulsion, and the success of the "Queen Alexandra" will undoubtedly result in a large introduction of turbine machinery. A long shade deck has been provided, which is used as a promenade, and it also is used to carry the boats. Buoyant seats are provided on the promenade deck, which extends nearly the whole length of the boat, and many of them are well sheltered from the wind. A social hall is fitted up for the first-class passengers on the main deck aft. It is upholstered in velvet, and the ceilings are finished in delicate tints, while fine polished hardwoods are used throughout. There is a well-arranged tea-room on the port side, while the larder, scullery and galley are located forward of the boiler room on the main deck, and the smell of cooking is thus kept entirely away from the passengers' quarters. Aft the turbines on the lower deck is the dining room for the first-class passengers, which will seat 100 people, and is well ventilated and lighted.

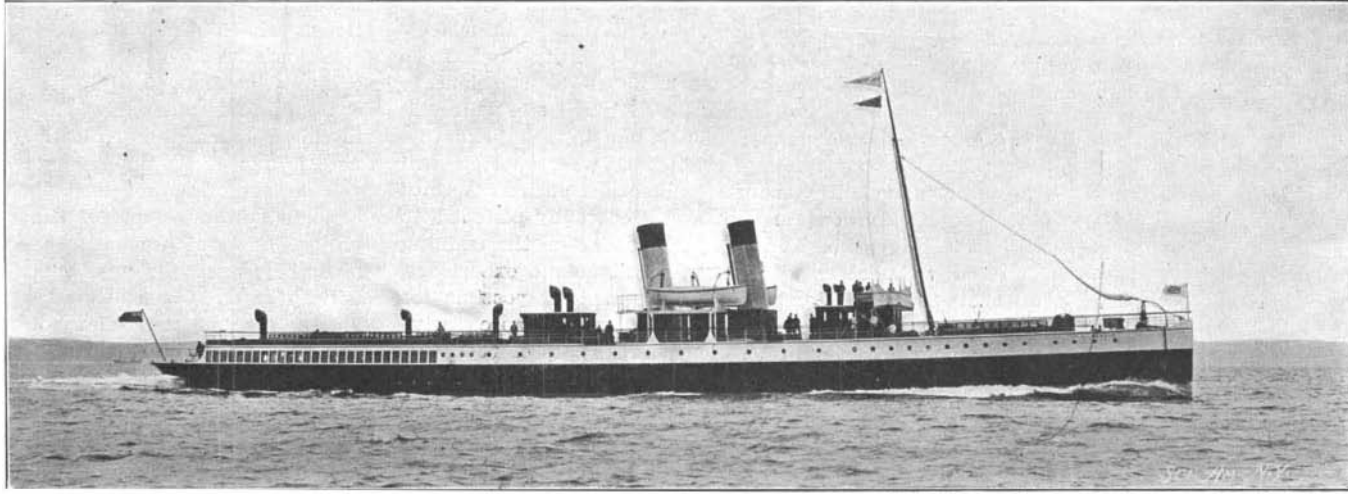
Much important and valuable experience has been gained by the running of the first vessel constructed, the "King Edward," which was equipped with Parsons turbine engines of the latest improved type. In case of reciprocating engines had been used, the best speed which could have been obtained would have been 19.7 knots, while 20.5 knots was actually done by the "King Edward." Of the increase of speed of 0.8 knot per hour, 0.2 was due to the lesser displacement of the vessel as a turbo-motored steamer, and 0.6 was due to the superior efficiency of the turbine engines and accessories. A gain in indicated horse power of 20 per cent is shown in the turbine steamer from the difference between 19.7 and 20.5 knots; but in reality it would be practically impossible to drive the "King Edward" at 20.5 knots per hour with ordinary reciprocating engines, as the additional weight which would be required would increase the displacement.

In reference to the coal consumption of the "King Edward," Mr. James Denny was able to give data very favorable to the steam turbine.

Under regular service conditions, a comparison between the turbine steamer and the "Duchess of Hamilton," which, however, was equipped with only compound engines, showed that the latter required 16

tons of coal when making 16½ knots, while the "King Edward" only burned 18 tons; and, even making proper allowance for the increased economy of the triple expansion engines of the latter over the compound engines of the "Duchess of Hamilton," if she were driven at 18½ knots, her consumption would be over 22 tons.

The "Queen Alexandra" is steered by steam steering gear, which is controlled by a wheel on the flying bridge. The main cables are worked by a powerful windlass, with warping capstan attached, which is fitted forward, while for warping the vessel alongside of piers there is fitted aft a steam warping capstan. Electricity is used throughout the boat for many purposes, including lighting, and the wiring is installed



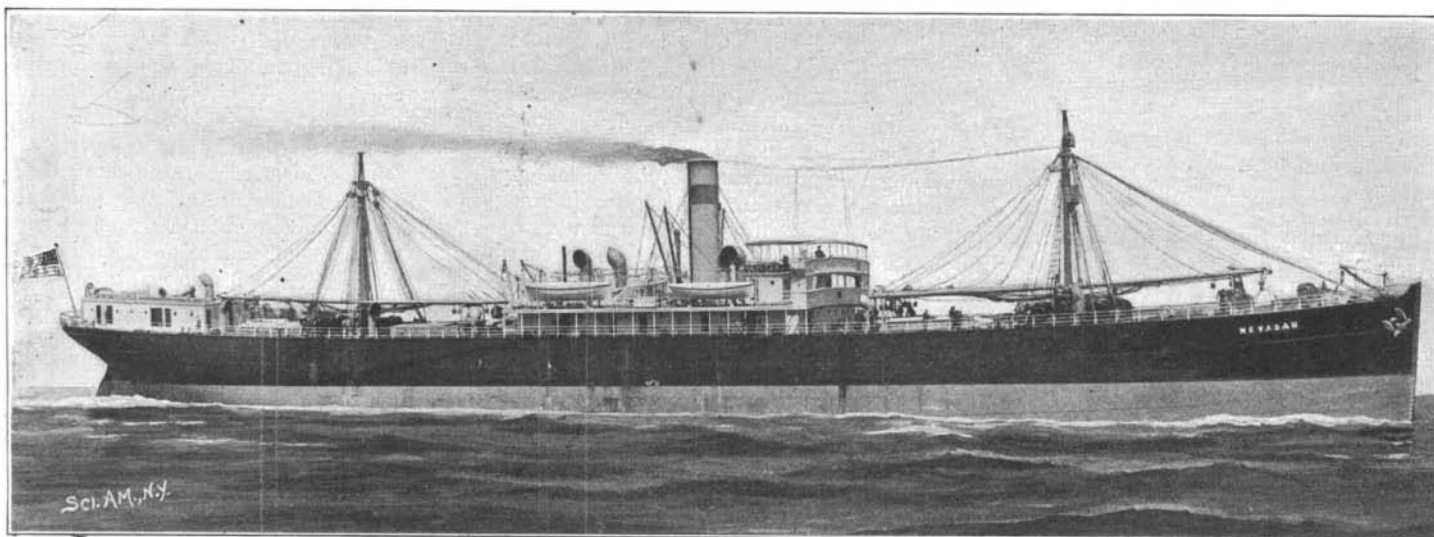
NEW TURBINE STEAMER "QUEEN ALEXANDRA."

Length, 270 feet; Breadth, 32 feet; Depth, 18 feet 9 inches.

on the concentric system. A large double-ended boiler is employed, having a funnel at each end, and the steam turbines, which are three in number, are of the Parsons type, one being high-pressure and the remaining two low-pressure turbines.

FIRST OIL-BURNING STEAMSHIP BUILT IN THE UNITED STATES.

The steamship "Nevadan," recently built at the yards of the New York Shipbuilding Company, of Camden, N. J., for the trans-Pacific trade, is the first vessel in the United States to be constructed to utilize oil as well as coal for fuel. After the decision to build the "Nevadan," the discovery of this fluid in large quantities in Texas decided the American-Hawaiian Steamship Company to provide equipment for burning oil if possible, and machinery was specially designed for this purpose. The plan of supplying oil to the furnaces is somewhat similar to that used on locomotives, the liquid being injected in the form of spray by utilizing steam jets. The tanks are located at a considerable distance from the engine room, and will be connected with it by piping. The "Nevadan" is also provided with bunker room for carrying coal



THE "NEVADAN," THE FIRST AMERICAN OIL-BURNING STEAMER.

sufficient for the round trip between San Francisco and the Asiatic coast, if it is necessary to carry this tonnage.

The steamship is one of the fleet which the New York Company has contracted to build for the American-Hawaiian Company for its service between San Francisco and the Hawaiian Islands. It is 371 feet in length, 46 feet beam and 34 feet depth of hold, with a carrying capacity of about 5000 tons cargo in addition to accommodations for passengers. The hull is constructed of steel, and is separated into several water-tight compartments. The engines are calculated to develop a speed of at least 15 knots an hour, while the ship is equipped with a series of modern steam winches for transferring cargo. It resembles in its

general features one of the better class modern tramp steamships, so many of which have been constructed in Great Britain in recent years, with a view of carrying a large tonnage at a minimum cost. As in this class of vessels, the engines are located amidships. It is provided with two pole masts, to which are fastened the booms utilized in raising and lowering cargo from the hold.

All told, the fleet which the company proposes placing in service is comprised of nine vessels, three of which are 488 feet in length, 57 feet beam, and 35 feet depth of hold, having an average carrying capacity of 8700 tons; four vessels 435 feet in length, 51 feet beam and 33½ feet depth of hold, with a carrying capacity of 6000 tons, in addition to the two of which the "Nevadan" is a type. The oil-burning equipment of the latter vessel has been shipped to San Francisco, where it will be installed and a trial made during the first trip across the Pacific. If the tests are successful, it is understood that the other vessels under contract will be constructed with the same end in view. The "Nevadan" is on its way to San Francisco by way of Cape Horn.

The work of the vessel will be studied with interest.

The End of the Pneumatic Gun.

No more striking illustration of the rapid improvement in ordnance is to be found than the abandonment by the United States government of the costly pneumatic gun plant at Sandy Hook.

In 1893 a contract was let for four 15-inch and two 8-inch dynamite guns. At that time extravagant stories of the weapon's power were circulated rather widely by the daily press. It was popularly supposed that these guns with their ability of hurling large masses of dynamite great distances rendered New York practically an invulnerable city. But about a year ago the Board of Ordnance and Fortifications made an elaborate investigation of these pneumatic guns, and upon their recommendation, the Secretary of War has decided to abandon the entire plant. The original cost of the weapons and accessories is said to have been \$1,000,000. They were sold for less than \$20,000 at a private sale.

Although the guns are no longer serviceable for the defense of New York harbor, they are not altogether worthless. It is said that the purchasers of the guns have sold one of them to the Turkish government for more than the price paid for the whole plant.

The reason for the abandonment of the Sandy Hook battery of pneumatic guns is not to be found in any structural defects, but simply in the improvement of modern ordnance. The pneumatic gun is the invention

of Captain Zalinski, who devoted his entire energy to the invention of a gun which would surpass in destructiveness anything that had previously been devised. The range of the pneumatic gun is about two miles; the modern 12-inch and 8-inch army guns, on the other hand, have ranges that vary from 5 to 10 miles, and are, moreover, much cheaper. That, in a nutshell, is the reason for the change.

The only advantage which the pneumatic gun now has over the powder gun is its ability to throw masses of nitroglycerine or high explosives of equal power and sensitiveness without danger. It may be safely said that powder guns have so far not proven successful throwers of aerial torpedoes. But their cheapness and general efficiency fully compensate for this defect.