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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

LATEST SUCCESS OF THE MARINE TURBINE.

When the history of the development of the marine turbine comes to be written, that period of it which deals with the application of the turbine to the transatlantic steamship must ever be closely associated with the name of the Cunard Company, which was the first seriously to consider the application of the turbine to the transatlantic steamship. This occurred in the early autumn of 1903, when the company was negotiating with the British government for two steamships that were to be larger and faster than anything at that time afloat. An engineering commission was appointed to investigate the problem, and after researches lasting for more than half a year, they reported early in 1904 in favor of the turbine. Meanwhile, however, the company had determined to build two large steamships of smaller dimensions and lower speed than the vessels above referred to, and the contract for the first of these, the "Caronia," was placed with John Brown & Co. on the Clyde. In 1903 the same firm, when bidding for a duplicate of the "Caronia," submitted an alternative design to be driven by turbines instead of reciprocating engines, and the contract for the second vessel, the "Carmania," was duly closed early last year. About the same time the Allan Line had determined on the construction of the two turbine liners "Virginian" and "Victorian," both of which are now in service. The "Caronia" and "Carmania" have been completed, and both are now sailing in the regular service of the company, the "Carmania" having just made her first successful trip to the port of New York.

The two ships are sister vessels in every respect but that of the engines; they have been built by the same firm; they will sail over the same route, and, therefore, under the same average weather conditions. Hence they afford an ideal opportunity for testing the relative first cost, cost of operation, and all-around usefulness of the reciprocating engine and the turbine in work of this character. When the "Carmania" has spent six or eight months in service, and her turbine equipment has thoroughly worked down to its bearings, the question of the relative efficiency of the old and the new type of engine will be proved to an absolute demonstration, at least as far as the Parsons type of turbine is concerned.

At the present writing, it is sufficient to say that so far as the trial trips and the maiden voyage of the "Carmania" are a criterion, the application of the turbine to an ocean liner of the largest size has been a brilliant success, and thereby the last doubt as to the ability of the steam turbine to supersede the reciprocating engine in practically every class of marine service, from the torpedo boat up to the 40,000-ton high-speed ocean steamer, is completely set at rest. What the success of the "Carmania" implies to her owners can be understood, when it is remembered that upon her success depended the profitable outcome of the investment of about eighteen million dollars, of which thirteen millions represents the cost of the new 25-knot turbine liners now under construction.

The question of the availability of the turbine in the largest passenger steamships has involved the three-fold question of speed, comfort, and economy, the first two being all-important to the passenger, and the last to the operating company. As regards the question of speed, the "Caronia" on her trial maintained an average speed of 19.5 knots an hour, with 22,000 indicated horse-power, whereas the "Carmania" showed an average speed of 20.5 knots per hour, for which the equivalent horse-power would be 25,500. The "Carmania" had not been in drydock for eight months, and her bottom was necessarily foul. With a clean bottom, it is reasonable to suppose that she would have made fully 21 knots an hour. The turbines received a most severe test on the voyage to New York, for, with the exception of one day, the whole distance was run against heavy westerly gales, in which at times the ship was driving "bows under." In spite of this, the turbines, because of the deep immersion of their propellers, were absolutely free from racing, and there was a complete absence of either vertical or horizontal vibration. The deep immersion of the propellers is due largely to their small diameter, the tops of the propeller blades being fully 16 feet below the water at normal draft, whereas the tops of the blades of the "Caronia" are only 5 feet below the surface. Consequently, even when the vessel is plunging heavily, the tops of the blades are never brought above the surface; being at all times deeply immersed in comparatively still water, they are working under conditions that are highly favorable to efficiency, and are entirely protected against "racing" and the excessive vibration which accompanies it.

It will be understood that the chief cause of anxiety as regards the huge turbines of the "Carmania" was as to whether the great increase in size would introduce some elements of difficulty which had not been developed in the smaller turbines. Hitherto the largest single unit was the low-pressure turbines for the "Virginian" and "Victorian" of the Allan Line, each of which weighed 78 tons. Each low-pressure turbine on the "Carmania" weighs 340 tons, a truly enormous advance to make on a single engine. That no mechanical difficulties are feared in the operation of the 75,000-horse-power turbines of the new 25-knot ships is due to the fact that the low-pressure turbines that are being built for those ships will not exceed 425 tons in weight, an advance on the low-pressure turbines of the "Carmania" of only 25 per cent.

THE QUEST OF THE NORTHWEST PASSAGE.

Fraught with the romance and tragedy of the ice-bound desolation of the North, associated for nearly four centuries with the most persistent endeavors of voyagers of nearly all nations, and remaining unpenetrated and chimerical almost to the dawn of the present day, the quest of the Northwest Passage rivals the search for the Pole in the annals of Arctic exploration. The earlier attempts to locate this waterway to the fabled riches and splendor of the Orient were prompted solely by reasons of commercial expediency, for the purpose of finding the shortest route between Europe and Cathay; but the utter impracticability of this became evident to European minds when it was understood that America was not merely Tartary or some other geographical dependency of Asia. Curiously enough this belief obtained in the old world for nearly a century and a half, and during this period those memorable expeditions to locate a Northwest Passage were undertaken and executed with consummate daring and skill by English seamen. Upon the realization of the commercial futility of these desperate voyages, the attempt to circumnavigate the northern littoral of the American continent ceased for a period, and until the beginning of those explorations led by the worthier motive of adding to the store of human knowledge and scientific attainment, the conquest of the bleak polar regions halted. With the exception of the attempts to reach the pole itself, no Arctic goal has been so eagerly sought as the Northwest Passage; and while, it is true, many of the later voyagers attempted this feat merely as an incidental part of the general plan of geographic research, we undoubtedly can say the same of the many dashes for the pole which have been made.

There is to-day no question that the earliest discovery, exploration, and even settlement of America were due to the Norsemen, those unequaled seamen and rovers of the ninth and tenth centuries. Their flourishing maritime settlements on the coasts of Greenland existed over five hundred years before the first voyage of Columbus, and as they pursued their fishing expeditions as far as Lancaster Sound and even Barrow Strait, we can fairly conclude that the initial step toward the location of the Northwest Passage was due to these voyagers, though it is inconceivable that the purpose was other than the pursuit of their fisheries. The actual beginning of the series of searches with the Northwest Passage as objective, which began almost coincidentally with the expeditions of Columbus, must be ascribed to the first voyage in 1497 of the Cabots, who penetrated nearly half way up Davis Strait in an attempt to sail around the continent, and thus attain the land of Cathay. Little further progress was made until the expedition under the leadership of Martin Frobisher, who in 1576 to 1578 discovered the entrances to Frobisher and Hudson Straits, and made a few scientific investigations, the first, by the way, which we hear of in any of these voyages. A later voyage, by Sir Humphrey Gilbert, was without important results.

The first great advance, not only in the search for a northern waterway to India, but in general polar exploration as well, was made in the three voyages of John Davis, who in 1585 first fairly discovered the strait that to-day bears his name, reaching what is now Godthaab, Greenland. After an unsuccessful voyage in the following year, Davis in 1587 with reckless daring pushed on to latitude 72 deg. 12 min. in the neighborhood of Sanderson's Hope, on the west coast of Greenland. His remarkable journeys covered the west coast of Greenland from Cape Farewell to Sanderson's Hope, and the American coast from Labrador to Cumberland Island. William Baffin, another of that deathless race of medieval navigators, in the "Discovery," a tiny vessel of only 55 tons burden, reached the islands known under his name to-day, crossed Baffin Bay *via* the "Middle Passage," and in 1616 was in Smith's Sound in sight of Cape Alexander. Baffin's farthest north of 77 deg. 45 min. remained unequaled in this region for 236 years, and his voyage added materially to the geographical knowledge of Ellesmere and Prudhoe Lands, and Smith, Jones, and Lancaster Sounds. The two latter he cautiously entered, and found them completely obstructed by ice, so that on his return to England he declared his belief in the non-existence of a Northwest Passage. The explorers of this time, English, Danish, French, and Dutch, were stimulated in their efforts to discover the Northwest and Northeast Passages, by the power of Spain, who in her arrogance and pride as the mightiest nation of the age, maintained her grasp upon the traffic of the Atlantic and Indian Oceans to the exclusion of all others.

Perhaps the most illustrious of all the seekers for this illusive waterway was Henry Hudson, whose explorations were pursued between those of Davis and Baffin. After vain attempts under the auspices of the famous Muscovy Company to find a Northeast Passage between Greenland and Spitzbergen, and Spitzbergen and Nova Zembla, in 1607, 1608, and 1609, he turned westward in the last year, and sailing along the American coast discovered New York Bay and the Hudson River. The following year he again sailed far north along the coast, through the Hudson Strait and into the great bay that bears his name, penetrating westward several hundred miles farther than had hitherto been accomplished. After wintering in Hudson Bay and suffering severely from tempestuous weather and failing provisions, part of his expedition returned to England. Hudson himself, one of the most tragic figures in the history of the Arctic, had miserably perished, after being set adrift in a small boat by his mutinous crew. It was now believed that the way to the Pacific had been discovered, and that it undoubtedly lay through Hudson Bay. Within five years a number of expeditions were made into this vast sheet of water, and in these Fox Channel and Rowe's Welcome were explored. This belief in an outlet to the Northwest *via* Hudson Bay persisted nearly to the beginning of the 19th century, and the English Parliament as late as 1743 offered a reward of £20,000 to the crew who should first traverse this outlet. At this time, too, the Russians began their attempts to prove the existence of the passage by seeking to penetrate from the westward through Behring Strait and, in general, to explore the polar archipelago. Only bare mention can be made here of these explorers, of Behring, Shalaroff, who in 1760 died of starvation with his entire crew, of Andreyeff, Billings, and Von Wrangell and Anjou, the last two making their famous sledge journeys in 1820 to 1823. In 1776 Capt. Cook sailed on his last voyage in an attempt to penetrate the Polar Sea to the eastward through the Behring Strait, but was separated by a solid barrier of ice from a ship sent to await him in Baffin Bay.

By the end of the eighteenth century Arctic exploration had ceased to be undertaken merely in the interests of furthering commerce, and it had begun to assume importance from a purely scientific standpoint. The first of these expeditions, scientific in character, sailed in 1818 to discover the Northwest Passage by means of the great openings reported by Baffin to exist at the westward end of Baffin Bay. Under the command of John Ross the expedition penetrated Lancaster Strait for about 60 miles, and on meeting with heavy ice Ross came to the conclusion that the strait was merely a bay, and returned to England. Parry, a lieutenant under Ross, disagreed with this view, and in 1819 led an expedition to again attempt the Passage. Parry was undoubtedly one of the ablest explorers of his time, and his achievements were splendid. He traversed Lancaster Sound, Barrow Strait, Melville Sound, and Banks Strait, practically demonstrating, had he but known it, the existence of a waterway leading through the Parry Archipelago to the Arctic Ocean. The expedition wintered at Melville Island after exploring that vicinity. Parry's later expedition through Hudson Strait and Fox Channel was important in relation to the terrible land journeys of Franklin, 1819-22, and in the exploration of Repulse Bay and Melville Peninsula. Ross, who spent several years in the Arctic, and thoroughly explored Boothia, King William Land, and adjacent waterways, persisted in his belief that there was no Northwest Passage. Of importance was the location of the north magnetic pole near King William Land by his nephew, J. C. Ross.

The problem of the Northwest Passage was really solved by the ill-fated expedition under Sir John