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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

Franklin, partly by its own efforts, but largely through the relief expeditions sent out later. The Franklin party, consisting of 129 men in two vessels, wintered at Beechy Island near the beginning of Barrow Strait in 1845, and in 1846 reached King William Land, where the ships were beset in the ice. From the only record found it was shown that a land expedition under Lieut. Gore had demonstrated unquestionably the existence of the Northwest Passage, but on the return of this party to the ships they found that Franklin himself with twenty-three men had died. The vessels were abandoned in 1848, and the remainder of the party perished in an attempt to reach the Fish River. The numerous search expeditions were very successful in exploring the American Arctic region from Greenland westward. Collinson, particularly, succeeded in navigating his ship, the "Enterprise," from Behring Strait to Cambridge Bay, Victoria Land, where he wintered safely, accomplishing his return the following year. During this time he had seen, though unknown to him, the sea wherein Franklin's ships had been destroyed, and had even picked up relics of that unfortunate expedition.

This brings us to the first actually accomplished Northwest, or rather Northeast Passage, made by M'Clure in 1850-54. In his vessel, the "Investigator," he reached Banks Land, which he explored as well as Prince Albert Land. After wintering there for three years he was finally forced to abandon his ship in Mercy Bay. Learning of a Franklin search expedition at Beechy Island, he managed to reach one of its ships, the "Resolute," by an extremely arduous sledge journey to the eastward, and was later taken to England through Lancaster Sound by the "Phœnix" of the same expedition. He thus completed the first passage from the Pacific to the Atlantic northward of America known to the history of mankind. M'Clure was undoubtedly the first of the great multitude of explorers to accomplish this feat, and while he had encountered continuous waterways for the entire distance, the journey was performed under such difficulty and hardship that until to-day no other navigator has attempted to equal it.

But the present year has seen inscribed on the pages of the Arctic's history the record of a journey which not only equals but far surpasses the remarkable trip of M'Clure. To Capt. Roand Amundsen, of Norway, belongs the honor of being the first actually to force his vessel through the historic Northwest Passage, traversing the northern shores of the continent from the Atlantic to the Pacific, and incidentally pursuing highly important scientific investigations which included the definite location of the north magnetic pole upon King William Land. To us the story of the Northwest Passage is more or less historical merely, for since the Franklin search expeditions, half a century ago, it has fallen rather into the background. The voyage of the Norwegian captain with a crew of seven men in his 46-ton sloop, the "Gjoa," is the final culmination of four centuries of toil, hardship, and suffering, and it gives to our matter-of-fact age an adventurous deed that forms a link between these prosaic times of steam and iron and that splendid period, crude in the seaman's art, but unequaled in enterprise and courage, which began with the discovery of America, and lasted for nearly three centuries.

## THE ELECTRICAL SHOW AT THE GARDEN.

The annual exhibition of electrical devices and apparatus now running at Madison Square Garden was opened with great *éclat* on the night of December 12 last. A special wire connected the exposition with a golden key in the White House at Washington, and immediately after an address of welcome by Prof. Seaver of Columbia University, President Roosevelt, at a signal from the Garden, touched the key, lighting the numberless lamps and setting the machinery in motion. A presidential salute of twenty-one guns was thereupon fired from the Garden tower to proclaim the official opening. In many respects the exhibition this year is a disappointment. It shows very little that is really new. The theaterphone exhibited by the New York Telephone Company has probably attracted the greatest popular interest. A number of telephone receivers are connected with three New York theaters, so that visitors at the Garden can follow the conversation and music of the various performances. The theter transmitter, which is still in an experimental stage, operates on the same principle as the ordinary transmitter, except that the diaphragm is made of wood instead of metal. In this way the metallic sound of the ordinary receiver is avoided, and a much sweeter tone is secured, which is particularly noticeable in the reproduction of orchestra music. No horn is used on the transmitter, as it is desirable to avoid all false or superposed vibrations. Even in its present unfinished condition remarkable results have been obtained, and the time may soon come when one can attend any performance or concert within reach of his wire without leaving his comfortable library chair.

A new electric elevator deserves more than passing comment. A large drum below the floor of the elevator is turned by an electric motor under control of the elevator operator. A spiral rib is formed on the face of the drum, and this engages two racks on opposite sides of the elevator shaft. Thus, the elevator feeds itself up or down according to the direction of rotation of the spiral. To relieve the friction the rack is formed with a series of rollers in place of fixed teeth. The main advantage of this system lies in the safety of the elevator; for no matter if the power should suddenly give out, the elevator will not drop, owing to the low pitch of the spiral rib. The construction also affords a considerable economy of power.

The subject of individual motor drive of machine tools and other machinery, which is just now arousing so much interest in the mechanical world, is represented by a number of variable-speed motors, which claim high efficiency under extreme conditions. Considerable interest centers in the Poulsen telegraphone, which was described in our columns two years ago. This instrument, it will be recalled, automatically receives and records telephone messages on a steel wire. This record may be read at any time by running the wire through the transmitter of the machine. One of the oddities, though by no means a novelty, is the electric clock system, in which a single master clock operates electrically all the clocks of a building, district, or entire city. The master clock is operated by weights, and at the end of each minute sends an impulse through the circuit which correspondingly moves every clock hand in the entire system. Thus perfect accuracy is maintained. No batteries are used in the circuit, but the electrical impulse is produced inductively by the movement of an armature through a magnetic field. In this way sparking at contacts is avoided.

The man who has not kept up-to-date on the subject of electricity in the household will find much of interest in this department of the exhibition. Complete kitchen equipments, including every variety of electrically-heated utensil from a tea kettle to a griddle, are shown. The household devices also cover a vast number of novelties ranging from sad irons, milk warmers, curling irons to electric heating pads which are used in place of hot-water bags. In contrast to these heating devices may be mentioned the small ice-making plants which are operated by electric motors. These are suitable for small stores which carry perishable goods. A number of medical apparatus and appliances are shown, such as vibrators and the like. Other features of the exhibition are wireless telegraphy, the mercury vapor light and converter, flaming-arc lamps, and various high-tension apparatus.

## THE DEATH OF EDWARD ATKINSON.

Edward Atkinson, the well-known social and political economist, of Boston, died suddenly on December 12. He was seventy-eight years old.

His education was secured in private schools and by his own efforts; his life, after the age of fifteen, being devoted to what he termed "work in a practical way."

After an extended experience in various branches of cotton manufacture he became interested in mutual insurance for manufacturers, and in 1878 was made president of the Boston Manufacturers' Mutual Fire Insurance Company, which he aided in establishing. He devoted much energy to the study of the prevention of loss by fire and the reduction of the cost of insuring, making an especial study of construction, occupation, and apparatus, the special hazards of textile factories, paper mills, cordage factories and machine shops, and the safeguards to make them better risks.

He regarded his invention of the "Aladdin Oven," a device for cheapening and simplifying cooking, as his chief life work, and the one designed to do most to carry down his name as a benefactor of the race. He gave the invention to the public freely, without patenting it. The efforts to push it were never especially successful.

As a pamphleteer Mr. Atkinson was prolific, and he contributed at various times to many magazines and newspapers. Among his published works are "The Distribution of Products," "The Industrial Progress of the Nation," "The Science of Nutrition," "The Margin of Profit," "Taxation and Work," "The Prevention of Loss by Fire."

## THE PATENT OFFICE.

The report of the Commissioner of Patents on the business of the Patent Office for the fiscal year ended June 30, 1905, shows that there were received during that year 52,323 applications for letters patent, 749 applications for designs, 174 applications for reissues, 1,846 caveats, 11,298 applications for trade-marks, 1,236 applications for labels, and 448 applications for prints. There were 30,266 patents granted, including reissues and designs; and 1,426 trade-marks, 1,028 labels, and 345 prints were registered. The number of patents that expired was 19,567. The number of allowed applications which were, by operation of law, forfeited for non-payment of the final fees was 5,154.

The total receipts of the office were $1,737,334.44, the total expenditures were $1,472,467.51, and the surplus of receipts over expenditures, being the amount turned into the Treasury, was $264,866.93.

The Commissioner states that the new trade-mark law of February 20, 1905, which took effect April 1, has caused an enormous increase in the trade-mark work of the Patent Office. The first three months that the law was in operation 9,710 applications for registration of trade-marks were filed, and it is apparent that the office will need to increase largely the force engaged on this work. Already the division of trade-marks has required the assistance of examiners and clerks detailed from other divisions from which they could ill be spared.

The Commissioner calls attention to the importance of the work of classifying patents, which is essential to the proper examination of applications, and invites attention to the necessity for an increase of force for this purpose. He states further that in view of the increased volume of work in the office, and its expected growth, there should be a corresponding increase in the number of employés and in the space provided for the transaction of the business, in neither of which particulars are the necessities of the office adequately supplied at the present time.

## SCIENCE NOTES.

M. P. de Wilde. professor at the University of Brussels, has taken up the study of the gold which is contained in sea-water. He proposes a new method of extracting it. A ton of sea water is treated with 4 or 5 cubic centimeters of an acid and concentrated solution of chloride of tin. The whole of the gold is thus concentrated in the complex body known as purple of Cassius, which contains gold, tin and oxygen. It is found that the purple body is fixed very strongly upon the flaky hydrate of magnesium which is set free in sea water when we pour in lime water. The hydrate falls to the bottom with the gold attached to it. The gold is set free by a cyanide of potassium solution (about 1 in 2,000) thus forming a cyanide of gold. The metal can then be extracted by a number of well-known methods. Liversedge shows that when sea water is sent in casks, the wood causes the gold to precipitate, and thus none is found in the water. M. de Wilde made experiments at the seashore in France on the west coast and found traces of gold in the water. He considers that much of the gold is thrown down to the sea bottom, and thus it escapes us. It will be remembered that Liversedge, professor at the University of Sydney, found from ½ to 1 grain of gold per ton of sea water from the coast of New South Wales.

From time to time we hear of experiments made upon the effects which certain colors seem to have upon the human organism. A recent contribution to this subject comes from Prof. Redard, of Geneva, who has been making researches with a view of using the physiological effects of colored light in surgery. At the Swiss Dental Congress he described a new anæsthetic effect which is based upon the influence of the blue rays upon the nervous centers. A number of experiments showed him that he could obtain a deadening of the nerves which was sufficient to allow of making some local operations of short duration. According to Prof. Redard, each of the primary colors has a special and well-defined action on the organism. Red light is an exciting and an irritating agent. We are aware of its action in modifying the virulence of certain eruptions and how it has been applied in the variole. Yellow light seems to have a depressing action, while with blue light we obtain a sensation of calm and ease. To apply the anæsthetic method with blue light, the patient is seated on a chair at 10 inches from a 15-candle-power incandescent lamp. The bulb of the lamp is of blue glass and it has a nickeled reflector. The head is covered with a thin blue veil and the patient directs his vision toward the lamp. After a few minutes the subject is found to be in an unconscious state, and on lifting up the veil we find that the pupil is dilated and the regard fixed. In this state a tooth can be extracted or other short operation carried out without pain. However, it must be understood that the effect succeeds better with some subjects than with others. Dr. Milliard, of London, used blue light for the same purpose. In twenty cases the success was complete. In eight others it did not succeed. The effect is not attributed to hypnotism, but to the direct action of the rays upon the nerve centers.

Limestone Island is the center of the New Zealand cement industry. It is about 100 square miles in area, and is wholly composed of hydraulic limestones. It was reported on originally by Sir James Hector for the New Zealand government as an island of hydraulic limestone of a quantity practically unlimited, and estimated to contain over 30,000,000 tons above water level. Beneath the limestone there is believed to be coal, and for this borings are now going on.