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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.

THE NEW CUNARD LINERS.

If there is one company more than another that is identified with the history of the transatlantic passage it is the Cunard Company, and its historical interest is enhanced by the fact that through all its long service it can boast of having never lost a passenger. At the present writing, however, one of its most famous vessels, the "Etruria," is being towed into port, suffering from that most common of all steamship ailments, a broken propeller shaft. This mishap, by the way, serves merely to emphasize the wonderfully successful record of this ship and her sister ship the "Umbria." Although they were put in service as long ago as 1888, they are now good for over 19 knots an hour. They are the largest single-screw vessels in the world, and represented, at the date of their launch, the most advanced ideas in marine engine construction. The "Etruria" was the first ship to make the transatlantic passage at an average speed of 20 knots an hour.

Equally famous as record-breakers were the next pair of Cunarders, the "Campania" and "Lucania," the latter of which was the first liner to pass the 22-knot mark for the whole passage. These two vessels, it may be truly said, were the progenitors of the high-speed twin-screw vessels of the last decade of the nineteenth century. With their great length of over 600 feet, their large engine power of over 30,000 horse power, and their use of tandem, multi-cylinder engines, they introduced the latest era in the growth of the high-speed liner, of which such vessels as the "Deutschland," "Oceanic," and "Kronprinz" are the latest developments. The Cunard Company have seemed content to rest on the laurels gained for them by these vessels, and for nearly a decade they have seen the German companies forge to the front in the production of ocean "fliers." For the past two years, however, they have been considering the question of putting two new high-speed vessels on the Queenstown route, and we are able to state authoritatively that it has now been determined to give these ships such speed-lines and engine power that they will be considerably faster than any ocean liner building or planned at the present time. The probabilities are that the contract speed will not be less than 25 knots an hour, and in view of the fact that to secure this speed in ships of the size would require not less than 47,000 horse power, it is natural that the company should seriously consider the adoption of the steam turbine, with the object of reducing the weight and bulk of the necessary installation of boilers and engines. Although the use of the turbine has not been definitely determined upon, there is a strong movement among the directors in favor of its adoption.

We commented last week upon the fact that in the equipment of one of the underground London railways, the central power station was to be equipped with steam turbines, each of 10,000 maximum indicated horse power. There is every reason to believe that the performance of these turbines will be eminently satisfactory. It is certain that the variations of load to which turbines of the same size would be subjected on board an Atlantic liner would not be more severe than those experienced in the operation of an electric road, for the turbine is peculiarly susceptible to its governor, and with the great depth of submersion of the propellers of ships of this size the liability to racing in heavy weather, with its resulting variations of load and stress, would be largely avoided. An equipment of four 12,000 horse power turbines on four shafts would give the required horse power for the speed, and we venture to say that the perfect absence of engine vibration—propeller vibration will always be present—would render these ships, should they be so equipped, the most popular high-speed liners in the world.

THE PARK AVENUE HOTEL FIRE.

The Park Avenue Hotel fire, in which a score of persons lost their lives, does not prove, as the daily press would have us believe, that fireproofing is a failure. On the contrary, there is every reason to

believe that it was the fireproof construction of the hotel, limited though it was in degree, that prevented a positive holocaust, in comparison with which the present loss of life would be insignificant. Strictly speaking, the building should be called semi-fireproof. It was built over twenty years ago, and probably included all the latest ideas on fireproof construction. The main walls, which are of brick, are substantial, and have a cast iron sheathing on the outside. The floors consist of I-beams with brick arches turned in between. There are the usual partition walls, and, of course, there is an abundance of inflammable wood-work throughout the building.

The evidence thus far come to light tends to show that the fire started at the bottom of an elevator shaft and spread from thence to the corridors on the various floors; and it is to the existence of a considerable amount of woodwork in the elevator shaft, in the windows opening from the shaft to the courtyard, and in the doors leading to the corridors, that the exceedingly rapid spread of the fire is due. Had this wood-work been fireproofed, or, better yet, had the window sashes and doors and all fittings throughout the shaft been constructed of metal, it is probable the fire would have been confined to the shaft, and that not a single life would have been lost. At the same time, the evidence of the Chief of the Fire Department shows that the hotel was sadly deficient in fire-fighting apparatus. The firemen complained of being unable to find stand-pipes or fire hose, and there appears to have been but very inadequate provision of fire alarms for meeting such an emergency as occurred on the night of the disaster.

Undoubtedly the loss of life was largely due to the ignorance on the part of the transient guests of the fact that there were rear staircases by which they could have escaped from the hotel. As it was, they rushed for the central staircase adjoining the elevator, and in doing so ran into the fire itself; a fact which emphasizes the necessity for providing more conspicuous signs than those that are ordinarily found in hotels to-day, directing guests to fire escapes or to alternate stairways and elevators. We venture to say that in scores of hotels, where there are two or more separate staircases or elevators, the majority of the guests are aware simply of the existence of the one elevator which is most adjacent to their own rooms. In this connection we would most earnestly impress the fact that in large hotels and office buildings it would conduce greatly to the safety of the guests if, instead of concentrating the elevators in one locality, they were placed at two or more widely separated positions in the building.

WIRELESS TELEGRAPHY IN NAVAL WARFARE.

The feat accomplished by Marconi on his recent trip to this country, when he received distinct tape-written messages from Poldhu, Cornwall, until he was over 1,500 miles from that point, must have served to silence all doubts as to the commercial practicability of wireless telegraphy. Nowhere is the success of this system being watched more keenly than by the navies of the world, for it is well understood that, in proportion as the range of wireless telegraphy is extended, will the operations of future naval campaigns be greatly modified. Already it is possible to communicate across 1,500 miles of water, and although it is true that the sending station of Poldhu is equipped with a specially powerful plant, we presume there are no mechanical or structural difficulties in the way of equipping naval scouting vessels with sending apparatus of equal power. We notice that the British government has authorized the construction of four new vessels of the naval scout type which are to have a speed of 25 knots an hour and are to be equipped with very lofty masts for wireless telegraphy purposes. It is probable that this type of ship, which was originated by Russia with the ships of the "Novik" class, is destined to enjoy a popularity similar to that of the torpedo boat and the destroyer. With fleets of these craft patrolling the sailing lines between the most important strategic points, a nation will be able to keep in close touch with all important movements of the enemy, and naval warfare will be played very much less in the dark than it has been. If, for instance, during our late war, wireless communication over 1,500 miles of water had been possible, the naval operations would have been greatly simplified and much confusion and anxiety avoided. It will be remembered that in our blind groping to get in touch with Cervera's fleet, and in the attempt to conduct the war by the triangular Washington-Sampson-Schley method of communication, the transmission of news was ultimately dependent upon the speed and good luck, in finding either commander, of the various converted yachts and cruisers of comparatively low sea speed that were used to carry dispatches. It is certain that many of the risks of the war that were run and much of the confusion and controversy that resulted were due to the difficulty of obtaining quick communication from shore to ship and between the ships themselves.

With a 1,500-mile-radius Marconi system installed, however, how completely the story of the war might have been changed. Let us suppose that stations similar to that at Poldhu had been erected at Key West and at Washington, and that all the important vessels engaged in the campaign had carried sending and receiving apparatus to match it. Let the reader take a map and strike, with a 1,500-mile radius, circles from Key West and Washington, and he will find that from both stations it would have been possible to communicate directly or indirectly with every vessel engaged in the Santiago campaign throughout the whole of the operations of the war. Instead of our fast ocean scouts "Yale," "Harvard," "St. Paul" and "St. Louis" having to remain within reasonably close touch of a telegraphic station, these vessels, had they been so minded, could have cruised far across the Atlantic Ocean; or they could have formed complete chains of communication with Washington by stationing one at the Canary Islands and another at Cadiz to give notice of the start of the Spanish fleet or fleets, and stationing the other two in mid-ocean to pick up the news and transmit it to Admiral Sampson, or direct to the Key West or Washington station. The "Oregon" would have been in touch with Key West nearly a week before she completed her voyage around Cape Horn, while, in the Philippines, Dewey, by leaving one of his smaller non-fighting craft at Hong Kong, could have cut the cable, as he did, and yet have communicated hourly with Hong Kong and so with the Navy Department at Washington.

Returning to the Santiago campaign, we can see that all the miserable imbroglio known as the Sampson-Schley controversy never have occurred, for Schley would have been relieved of all doubt as to the proper course to take in the matter of blockading the Spanish ports, or of making retrograde movements, for he would have been in touch both with Sampson and the Navy Department at Washington, either directly, or through the intermediary of some United States vessel, carrying the Marconi equipment.

In view of the far-reaching effects which the demonstrated success of wireless telegraphy is bound to have on naval warfare we are glad to notice that Rear-Admiral Bradford, Chief of the Bureau of Equipment, is said to have ordered wireless telegraphy equipments of various types, in which are included the Marconi and the Slaby-Arco, which are to be thoroughly tested before it is decided what system will be adopted by the United States navy.

A PLEDGE TO IMPROVE THE PARK AVENUE TUNNEL.

The investigation by the Grand Jury of the recent accident in the Park Avenue tunnel of the New York Central Railroad Company, in which seventeen people lost their lives, has resulted in the indictment of the engineer of the New York Central train for manslaughter, and the dismissal of the complaint against the railroad company. The complaint stated that it was the duty of the company to use all reasonable means to prevent trains from running under such close headway as to be in danger of collision, and to equip their line with an adequate system of signals, but that the company omitted to perform its duty as thus outlined. The testimony before the Grand Jury occupied three days and a half in presentation, and a day and a half was spent in discussing the same. District Attorney Jerome has stated that the law in the case was carefully examined by himself and his assistants, and that the Grand Jury, which he describes as being "exceptionally intelligent," fully understood everything connected with the case. Furthermore, Mr. Jerome, who certainly cannot be accused of partiality to the railroad company's side of the case, was of the opinion that further proceedings against the railroad company would be inexpedient and futile.

Unquestionably, the feature in the evidence which was considered to absolve the railroad company from the charge of culpable negligence was the practically unanimous testimony of the experts that the signaling system employed in the tunnel was the very best in existence. Speaking in a general way, and considering this system of signals in respect of its efficiency when used under normal conditions, we quite agree with the experts that it is the best in existence. But inasmuch as the system depends for its efficiency upon the visibility of the signals, and the evidence clearly proved that, under conditions which are perpetually occurring in the tunnel, the signals are not visible, we are inclined to think this "best system in the world" for use in the open and under normal conditions, ceases to be so under the exceedingly abnormal conditions that exist in the Park Avenue Tunnel. We venture to say that there is no stretch of track in all the 400,000 miles of railroad in the world where the conditions are similar to, or even approach, those in this tunnel. "What is one man's meat is another man's poison." The best signals in the world for the stretch of viaduct, for instance, by which the New York Central tracks approach the tunnel, from the north, may become, as the event has surely proved, an exceedingly unreliable and treacherous system if it is extended

into the darkness and smoke and steam-obscured atmosphere of the tunnel itself. In saying this we are still in perfect agreement with the findings of the Grand Jury, who had to deal simply with the legal technicalities of the case and the expert evidence as presented. What we claim is that where a signal system that depends on visibility ceases to be visible, it is time to apply some automatic, contact system, which shall be independent of atmospheric conditions, and shall stop a train with the certainty with which any other well-designed automatic appliance performs its functions.

Having said this much, however, we hasten to state our gratification with the very prompt and unmistakably sincere pledge which the Directors of the New York Central Railroad Company have recently given to the Mayor of New York city, that just as soon as they can obtain the proper legislative sanction they will proceed with the electrifying of the local suburban service and the construction of the tunnel-loop terminals beneath the present Grand Central Depot. This pledge has been given in the form of a letter signed by Messrs. Vanderbilt, Depew and Morgan and a half dozen other prominent Directors. The letter opens by stating that the writers have been informed that the Mayor has given his support to a bill pending in the Assembly, the object of which is to name a fixed date on and after which the use of steam in the Park Avenue tunnel shall be forbidden; that the Directors are advised that, while it is practicable to operate the suburban service electrically by using the side tracks and an underground loop at the terminal, in the present stage of the art it is not practicable to operate electrically the heavy through trains which carry distant as distinguished from local traffic; and that the company is ready to undertake this work of construction as soon as the requisite consents from State and municipal authorities are obtained. At present there is a law existing which forbids the use of any power except steam in the tunnel.

The letter, deprecating the fixing of a strict time limit, proceeds as follows: "In lieu of such legislative action, the company herewith pledges to the city its good faith to proceed with the substitution of electricity for steam upon the side tracks immediately upon the grant to the company of the necessary authority to do so, and to carry the work forward as rapidly as possible. In addition the company also pledges itself to substitute electricity for steam in the operation of the central tracks, as soon as and whenever a practical plan can be prepared which gives reasonable promise of producing satisfactory results. This pledge on the part of the company is intended to carry with it the good faith of the individual Directors who compose its Board."

On receipt of the letter, Mayor Low communicated with the Chairman of the Assembly Committee on Railroads in Albany as follows: "In any private relation of life the personal assurance of these gentlemen (the signers of the letter) would be considered as being in every respect as good as their bond. The letter, therefore, seems to me to lay a good foundation for the waiving of a fixed date to be named in the bill for the prohibition of the use of steam in the tunnel, provided that in other respects the railroad company meet the views of those most interested." We do not doubt that the great majority of the public will agree with the Mayor in accepting the pledge of the New York Central Directors as being given in perfect good faith. There is every commercial reason why the company should desire to ameliorate tunnel conditions, to say nothing of the humanitarian side of the question. Unquestionably the interests of the company in the past have suffered enormous injury because of the "tunnel nuisance," as it is very aptly termed, and the recent accident is bound to have a most serious deterrent effect upon home-seekers who, but for the tunnel, would be disposed to locate in the many charming suburbs along the Sound and in Westchester County. The ordinance prohibiting the use of any other power than steam in the tunnel should be repealed at once. As to the question of fixing a time limit, we think that as a mere question of business policy it should be done. Tunnel building and the electrical equipment of suburban lines are not new and untried arts; and it would not be difficult to name a date for the completion of the New York Central changes which would cover all possible contingencies. The anxiety of the company to have the time limit clause waived, is easily explained. The problem of electrical equipment of large systems is passing through a critical stage, and there are some questions that a delay of a few years would see satisfactorily solved, such, for instance, as the relative value of the steam turbine and the reciprocating engine for central power plants, or the superiority of the direct-current (American) or alternating current (Ganz) systems of motors. The immediate adoption of one or the other system might ultimately prove to be a costly move to the company. This, however, is a risk that the company must be prepared to take; for it is out of the question to ask the public to wait for an indefinite period, while the question of the best

system of electrification of steam roads is being solved. There is a good system available for suburban railroad traffic now. Let the company use it; and let the Legislature by all means fix a reasonable time limit for the completion of the work.

THE BRITISH NAVAL PROGRAM FOR 1903— REORGANIZING THE FLEET.

BY OUR ENGLISH CORRESPONDENT.

According to the naval program of the British government for 1902 many important changes are advocated in the construction and armament of future battleships. This decision is the result of the recent progressive developments in explosives and projectiles. The vote for the navy for the present year aggregates \$156,275,000, which is an increase of \$897,500 over the estimates for the year 1901. Of this total sum \$45,290,000 is to be expended upon the construction of 27 new warships of all types, comprising: 2 battleships, 2 armored cruisers, 2 third-class cruisers, 4 "scouts," 9 destroyers, 4 torpedo boats, 4 submarines. Although the sum voted for new vessels is smaller than was anticipated, the Admiralty, following the example of France and certain other European powers, intend to devote a large sum of money to extensive rearmament and overhauling of the largest and comparatively recent vessels of the present navy. This scheme of modernization affects 25 vessels in all. The plan of reconstruction is as follows:

Eight battleships of the "Royal Sovereign" class to have secondary batteries on upper deck (comprising six 6-inch quick-firers each) placed in armored casemates.

Battleships "Barfleur" and "Centurion," each to have her ten 4.7-inch guns firing a 50-pound shell replaced by 6-inch quick-firers firing a 100-pound shell.

Cruisers "Powerful" and "Terrible," each to have four more 6-inch quick-firers in casemates added, increasing the total number of these weapons to 16.

Thirteen cruisers of the "Arrogant" and "Talbot" classes, each to have six 6-inch quick-firers in place of 4.7-inch weapons.

During 1902 the construction of 60 new vessels will be completed and 27 new vessels commenced, and by March 31, 1903, the navy will be augmented by the following strength: Battleships, 13; cruisers, armored, 22; cruisers, second-class, 2; cruisers, third-class, 2; sloops, 4; auxiliary vessels, 2; destroyers, 10; torpedo boats, 5; battleships authorized in 1902 program, 27; total, 85 vessels of all types.

The decision of the Inquiry Committee into the recent mysterious loss of the torpedo-boat destroyer "Cobra" in the North Sea, due to frailty in construction, and also the numerous accidents, such as buckling and starting of plates, that have befallen other destroyers when encountering heavy weather, has not proved unavailing with the Naval Department. The designs for this type of vessel and the work it is to accomplish have been considerably modified. When destroyers were first designed it was not contemplated that they would be frequently used otherwise than as working from a fixed base. Experience, however, has shown that vessels with greater sea-keeping power are required for service with the fleets, and, accordingly, the Admiralty has decided both materially to strengthen the type of future destroyers and also to create a new class altogether, to which the name "scout" has been given. The Admiralty do not propose that the naval designer should initiate a design for this new class of vessel, but invite the private ship-builders of the country to give the navy the benefit of their creative ingenuity by submitting designs to fulfill certain stated conditions.

Moreover, a special committee has also been appointed to advise the Admiralty in respect of the strengthening of some of the existing vessels. The Naval Department has often been urged to build large numbers of destroyers at a time; but this is not considered an advisable policy. In the first place, the destroyer is a type of warship which is still in process of rapid evolution; in the second place, it must by its nature be a short-lived type; and to build large numbers in the same year would inevitably result in large numbers becoming obsolete at the same time.

A new departure is also to be made in connection with the disposition of the armor, in the armor-clads, as an offset to the vast improvements that have recently been made in high power explosives and shells. This arrangement of the armor is to be made upon the three new first-class battleships, which will be named, respectively, "King Edward VII.," "Commonwealth" and "Dominion." When completed these vessels will be far ahead of any of the battleships in the British navy, so far as the armor protection and its scheme of disposition is concerned. Indeed, the only vessel to compare with them is the Japanese battleship "Mikasa," built by the Vickers-Maxim Company, whose design is stated to be the result of this innovation in the British practice of armor protection. As in the "Mikasa," the main broadside armor of the new British ships is to be carried to the upper deck, so that all broadside guns on the main deck will

be completely protected by the armor of the citadel. The new British ships will excel the Japanese "Mikasa" in the thickness of plating, owing to their larger total displacement, for while the "Mikasa" is 15,200 tons, these new vessels are to be of 16,350 tons. This main belt will, as in the "Mikasa," be between 21 feet and 22 feet deep, extending 5 feet below the water line, so that in the event of the ship's rolling there will be no chance of the unarmored bottom being exposed, even momentarily, to hostile fire. Over 70 per cent of the total length of the new ships will be protected by belts, whereas in the "Majestic" class the proportion of the length armored is 55 per cent, in the "Admiral" class 43 per cent, and in the "Inflexible" 34 per cent. The water line belts in the new ships will be 9 inches thick in the citadel, reduced by stages to 4 inches at the ends. For the length of the citadel the thickness will be 8 inches from the main belt up to the level of the main deck, and from the main deck to the upper deck 7 inches. The division bulkheads between the 6-inch guns on the main deck and the longitudinal armor wall behind the guns will be of hardened steel.

The new armored cruisers are to be of a modified "County" type. They will be 450 feet in length, 67 feet beam, and 10,200 tons displacement, whereas the "County" class measure 440 feet in length by 66 feet beam with a displacement of 9,800 tons. The new vessels, however, will have the same draught of 24 feet 6 inches. The slight increase in length is to enable a different type of boiler to be used, and also to allow of 7.5-inch guns to be used in each turret at the forward and after end of the vessels, instead of twin 6-inch guns as in some of the preceding ships.

Another new departure is to be the inauguration of coal depot vessels for torpedo-boat destroyers, of two distinct characters, to be utilized accordingly as the destroyers are, or are not acting from a fixed base. One class of depot ship is being prepared for the flotillas at the home ports, and the "Leander" is being prepared as a depot ship for the destroyers in the Mediterranean. From this experience the Naval Department hope to learn more clearly what is exactly required in this direction; but if the new "scout" class should prove a success, these depot ships would not be wanted for them to the same extent. In the case of distilling ships, one has been bought and fitted which should be in service within the year, and experiments have been made with others. But in this connection it is suggested that far more satisfaction would be attained if by improvements in the boilers ships were to distill their own water, and to be rendered independent of auxiliary distilling vessels.

In connection with fuel, the Admiralty are continuing their experiments with the Temperley-Miller apparatus for coaling battleships while in motion, and are also studying the possibility of utilizing oil fuel. An engineer has been specially detailed to superintend the latter experiments, so that the trials may be conducted thoroughly, and exhaustive information obtained as to the feasibility of employing liquid fuel upon a sufficiently extensive scale. Reserve stocks of patent fuel have been deposited at the several naval depots abroad also.

Although the unfortunate disasters to the "Viper" and "Cobra" prevented the Admiralty from obtaining sufficient data regarding the possibilities of utilizing the Parsons turbine for the propulsion of war vessels, the Naval Department intend to experiment further with these turbines. For this purpose two torpedo-boat destroyers and one third-class cruiser are to be engined with the Parsons turbine. The fitting of the turbine in the latter vessel will afford a splendid opportunity for effectively testing its qualities as compared with reciprocating engines, for in this case, in view of the high speed to be developed, the weight available for the machinery has to be minimized. The speed for 3,000 tons displacement on a draught of 14 feet 6 inches is to be 21¾ knots, and yet only 548 tons is allowed for machinery; so that even with water-tube boilers of the express type only 2.65 square feet of heating surface is allowed per horse power, and the boilers are required to develop 20 horse power per square foot of heating surface.

An important alteration has also been made with regard to the letting out of contracts and the supervision of naval construction in private yards. Hitherto this duty has been performed by the Department of Naval Construction. It is now considered, however, owing to the magnitude of the fleet, that this department is sufficiently occupied with the duty of designing. This responsibility of supervising private naval work is to be vested in a new department, the chief of which is to be officially known as the Controller of the Navy. The qualifications of this official are a thorough knowledge of Admiralty practice and an exhaustive technical knowledge of ship construction. It is anticipated that naval construction in private yards will, as a result of this change in the Admiralty administration, considerably facilitate and expedite the execution of Admiralty contracts, which will result in a greater efficiency and economy.