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NEW YORK, SATURDAY, MAY 10, 1902.

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.

FASTEST AUTHENTIC RAILROAD RUN ON RECORD.

The fastest run ever made by a railroad train for the distance was that accomplished last month on the Burlington and Missouri River Railroad, between the two stations of Eckley and Wray, Colo. The two towns are 14.8 miles apart, and the run was made in an even nine minutes, which works out at a rate of 98.66 miles per hour. The train was made up of a mail car, baggage car, two chair cars, three sleeping cars, a dining car, and a private car, or nine cars in all. It was drawn by a ten-wheel engine with 19-inch by 26-inch cylinders, and 72-inch drivers; the line is on a downgrade with a maximum of 32 feet to the mile. The timing of the train was done in the observation car by five watches, one of which was held by the conductor, and the record is considered to be so accurate and well authenticated that it has received the official confirmation of the Chicago, Burlington and Quincy Railroad.

PERILS OF SUBMARINE NAVIGATION.

The submarine torpedo boat "Fulton," during the course of her coastwise trip to the South from New York Harbor, made a successful run to the mouth of the Delaware, but, unfortunately, as she was rounding the Breakwater, there was an explosion of gas within the boat, which more or less seriously injured five of the crew. The run seems to have been fairly successful, the "Fulton" having made several dives during the night as she was passing down the Jersey coast, on one occasion remaining submerged for a distance of two miles. Probably it would be unjust to ascribe the accident to any special features of the submarine as such, since explosions due to the same cause occur in gasoline launches. At the same time it cannot be denied that the use of gasoline as a fuel becomes particularly perilous in this type of torpedo boat, where the chances of escape in the case of accident are very remote.

THE GATHMANN GUN AGAIN.

According to reports from Washington, Lieut.-Gen. Miles has issued an order reconvening the Board of Army and Navy officers which conducted the test made last fall at Sandy Hook of the Gathmann gun, for the purpose of "considering the statements made by the president of the Gathmann Torpedo Gun Company, regarding the results of the tests of their 18-inch gun, as reported to the Board, and to make replies thereto." It will be remembered that the Gathmann gun was designed upon the theory that if you can deliver a shell charged with a large amount of guncotton against the hull of a battleship and detonate it there, the sides of the vessel will be blown bodily inward and the ship, of course, sent to the bottom. The test referred to was made at the request of the Gathmann Company in competition with a service 12-inch army rifle, firing ordinary shells. Each gun delivered its attack against an 11½-inch Krupp plate, backed up by a structure representing a section of a modern battleship's side. After three rounds, the Gathmann gun broke the plate in two without penetration, while the army gun penetrated its plate and completely tore to pieces both the plate and backing. The Board reported that while the army gun, firing maximite and explosive "D," was successful beyond expectation, the Gathmann gun failed to do any injury to the target commensurate with the size of the gun and the enormous charges of high explosive employed. It seems to us that the question is one of relative efficiency. The Army naturally desires to secure the most serviceable gun, shell and detonating fuse; and while the Gathmann gun did considerable execution, in our opinion it was not at all comparable with that done by the service gun; indeed, we cannot see how the Board could have arrived at any other conclusion as to the relative merits of the two types, than that which they gave in their report. For a lengthy description of these famous trials and photographs showing the condition of the two armor plates after trial, reference is made to the SCIENTIFIC AMERICAN of November 30, 1901.

FESSENDEN'S ELECTRIC WAVE-DETECTOR.

Widespread interest has been aroused by the experiments which have been carried on by Prof. Fessenden with a new form of aerial telegraphic receiver, which is claimed to give promise of considerably greater rapidity than the coherer with which the public is generally familiar. The experiments have been carried out under the auspices of the Weather Bureau, and have extended over a period of about two years. Some of the results achieved have been made public by the Bureau, and they are considered to foreshadow a great improvement in the speed of aerial telegraphy. The work has been carried on between Hatteras Inlet and Roanoke Island, over a distance of fifty miles, and messages have been sent and received without the use of the coherer, the place of which is taken by the new receiver, which Prof. Fessenden calls a wave-detector. He claims that he has worked it experimentally at speeds which would be equal to over five hundred words a minute, and this with only about twenty-five per cent increase of energy per signal over that which is used with the ordinary apparatus. We understand that the wave-detector consists of a wire whose conductivity is automatically increased and diminished through a range which can be determined by the adjustment of the apparatus, and that the making and breaking of the circuit is so delicately adjusted that the higher speeds are easily realized.

ATTUNED WIRELESS TELEGRAPHY.

After eight years of litigation Prof. M. I. Pupin, of Columbia University, whose brilliant inventions in long-distance telephony are fresh in the public mind, has been granted his application, made in 1894, for a system of selective resonance, or "tuning" as it is popularly called, of electrical circuits. As far back as May 17, 1893, Pupin delivered a lecture at the general meeting of the American Institute of Electrical Engineers, in this city, on "The Practical Aspects of Low-Frequency Electrical Resonance;" and on applying for his patent he was surprised to discover that similar applications had been made by a member of the French firm of Hutin & Le Blanc, and by Mr. Stone for the Bell Telephone Company. The decision in Pupin's favor was made known to him a few weeks ago, and the result naturally takes on special significance when it is learned that up to date something like two hundred applications for patents on systems of tuning electrical circuits have been filed at Washington.

At the time that his investigations were started, Pupin had in mind the application of tuning to ordinary telegraphic circuits; for wireless telegraphy could scarcely be said to be in the air at that time. Immediately upon the successful development of Marconi's investigations in aerial telegraphy, the question of tuning naturally took on a new significance. Briefly stated, Pupin's system provides for the construction, in connection with a given line, of a number of branch electrical circuits, so arranged that each corresponds to a certain pitch of frequency, with the result that by impressing an alternating electro-motive force of a certain frequency on the line (or, in the case of wireless telegraphy, on the ether) the corresponding receiver will respond strongly. The value of this principle as applied to wireless telegraphy for the purpose of preserving secrecy, or of directing, or more properly speaking confining, the Hertzian waves to the desired receiver, is obvious. Thus, at each of six separate stations, the receiving apparatus might be arranged for a certain frequency, say 200, 400, 600, as the case might be. To make sure of the desired station, and that one alone, receiving the message, it would simply be necessary to utilize in the sending station a current of corresponding frequency.

Prof. Pupin has recently concluded an arrangement with the Marconi Company by which they are granted the exclusive license to use his system of tuning; and as these patents cover not only the United States, but every country in the world except Germany, where the obstructions placed in the way of his securing his patents were such as to lead Prof. Pupin to give up any attempt to prosecute his claims in that country, it will be seen that the position of the Marconi Company is enormously strengthened by the right to operate under this system. The method of tuning to which Marconi has so often referred as having satisfactorily solved the problem of secrecy and control, is the one originated by Pupin; and the arrangement recently announced only awaited the granting of the patents, for its final ratification.

THE NAVAL APPROPRIATION BILL.

The bill reported by the Chairman of the Naval Affairs Committee of the House asks for the generous appropriation of $77,659,386. Naturally, the section of the bill which will excite the most interest is that relating to the increase of the Navy. Provision is made for two first-class battleships of the highest type, which are to cost not over $4,212,000 each and are to have a displacement of 16,000 tons; two first-class armored cruisers to cost not over $4,659,000 and to be of 14,500 tons displacement; and two 1,000-ton gunboats, whose combined cost is to be $3,802,000. The total cost of the six ships thus provided for will be $29,500,000, of which $9,000,000 is for armor and armament.

The Report states that on January 1, 1902, there were in process of construction eight battleships, six armored cruisers, nine protected cruisers, four monitors, fifteen torpedo-boat destroyers, nine torpedo boats and seven submarine boats. Although this total of fifty-eight ships under construction would seem to indicate the activity with which the construction of our Navy is being carried forward, we regret to say that the figures are misleading, for the reason that the private firms which have undertaken the contracts for these ships are wofully behind their contracts. Out of the whole fifty-eight, no less than thirty-five are behind from nine months to over three years. Thus the battleships "Maine," "Missouri," and "Ohio" should have been completed last summer; the four monitors in March, 1901; the fifteen torpedo-boat destroyers were contracted to be completed in April and May, 1900; the torpedo boats should have been completed between January and November, 1899, and the submarine torpedo boats between April and October, 1901.

This shameful state of things, for it is nothing less, proves that so far from the work of upbuilding our new Navy and properly safeguarding the naval interests of the country being in a satisfactory condition, it is in an extremely backward and, if we bear in mind the enormous activity of other nations, positively neglected condition. That this is not an exaggerated statement is evident when we consider that when these ships, which are all the way from one to three years behind time, were authorized, it was considered that they represented the minimum addition to our Navy that could be made consistently with the interests of the country, and that naval programmes which are three years behind mean a relative gain in strength by the navies of competing countries. Take, for instance, the case of Germany with its sixteen-year programme and its original intention of spreading that vast addition to its fleet evenly over the sixteen years. So far from doing as we are doing, letting the whole programme run behind to the extent of two or three years, the Germans have gone to the very opposite extreme, and have reduced the term of completion by six or seven years; not only that, but they have launched other and more ambitious programmes, and are building ships, not as we are doing, more slowly, but considerably faster than was originally proposed. We do not wish to be alarmists, nor are we when we state that whereas three or four years ago we stood slightly in advance of the German Navy, to-day, owing to the apparent indifference of the private shipbuilding firms to the interests of the country, we are considerably behind Germany and we are dropping behind at an accelerated pace. We say this with a full knowledge that a few months ago we made a comparison of the United States Navy with that of Germany on the basis of ships authorized and actually commenced, which showed us to have a lead over that country; but that comparison did not take account of the relative energy with which the two countries were living up to their naval programmes. We neither knew that Germany was pushing hers through with such haste, nor that this country was falling behind her own to such an alarming degree.

It is in view of the above considerations that we feel called upon to express the most profound satisfaction at the consent of the Naval Affairs Committee to recommend the building of some warships in government yards. The Report says: "In view of the fact that there is some public sentiment favorable to building ships in our government navy yards, it has been deemed advisable for the Committee to insert a provision in the appropriation bill of this year, leaving it in the discretion of the Secretary of the Navy to build any or all of the ships in government yards, but making it mandatory on him to construct at least one battleship or one armored cruiser in such navy yards as he may designate, as an experiment; and it is further provided that he shall keep an accurate account of all expenditures for labor and material and the inspection and construction of such ships, and report to Congress at each session; and upon the completion of said ship, he shall make a detailed report, showing the relative cost of one built by the government and one by contract." The report puts it altogether too lightly when it says there is "some" sentiment; for we are satisfied that outside of the shipbuilding companies themselves, who naturally are not favorable to government-constructed vessels, there is an almost universal demand that the costly plant of our navy yards, instead of lying idle when there are no ships under repairs, shall be properly employed in the construction of new vessels. The naval constructors to a man are most enthusiastically in favor of this measure. They point out that as matters stand at present, when repair work is slack the skilled forces at the various yards have to be largely broken up and dismissed,