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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 UNITED STATES AND THE COMMAND OF THE PACIFIC.

There are two sea fights of modern history that have served to thrust the United States, in spite of its traditional and constitutional desire to stay within its own borders and on its own seaboard, right into the very center of that struggle for commercial and political control of the far East which promises to furnish the greatest drama of the kind in the history of the world. Of these decisive battles, the first occurred on the first of May, 1898, when Admiral Dewey destroyed the Spanish fleet at Manila; the second, on August 10, 1904, when Admiral Togo drove the Russian fleet back into Port Arthur, and, as the event has shown, destroyed Russia's last hope of maintaining her naval supremacy in the far East. As the ultimate result of the battle of Manila, the United States finds its outposts advanced some five thousand miles to the westward, and established in a scattered group of islands, which in the event of hostilities would become the inevitable point of attack by any hostile naval power. From the year 1898 to the beginning of 1904 the problem of the defense of its far Eastern possessions was no greater for the United States than for any of the European powers that possessed interests in the Pacific Ocean; in fact, the distance of the Philippines from the United States is considerably less than the distance of Indo-China, Kiao-Chow, or Hong Kong from France, Germany or England; and during that period the Japanese navy was not looked upon as a sufficiently formidable competitor to exercise a controlling effect upon our naval policy in the Pacific. The battle of August 10 and the sweeping victory in the Sea of Japan, however, have changed all that. Not only has the absolute annihilation of Russia's Pacific fleet relieved the Japanese government of the repressive influence which was necessarily exerted by the presence at her doors of an ever-threatening hostile fleet; but the positive genius for modern naval warfare displayed throughout all ranks of the Japanese navy has increased its prestige and enhanced its fighting value enormously. Should the war bring no material increase in the tonnage of the Japanese navy, the latter will constitute, because of its propinquity to the Philippines, the most important element to be considered in the future defense of those islands. But as a matter of fact, the war will leave the Japanese navy far stronger than it was at the outset. Captures and new construction during the war have already more than offset the Japanese losses, and if the ships interned in neutral ports are handed over to Japan as part of the indemnity, she will possess, in completed ships, a total tonnage that is only about 16,000 tons less than the completed tonnage of the United States navy on November 1 of last year. That a large portion of the indemnity, should one be paid, will be appropriated to the construction of battleships and cruisers of the very latest type, is a foregone conclusion. Most of the new ships will be built in British and Japanese yards, and the former, at least, will be completed with dispatch.

In the presence of these facts, our Board of Naval Strategy must already have realized that, unless Congress is willing to continue a liberal policy in the matter of naval appropriations, we are within measurable distance of the time when the Japanese will have, in the Pacific, a navy that is enormously superior to any possible force which we could concentrate in those waters.

THE CANAL FROM PITTSBURG TO THE LAKES.

The magnitude of the iron and steel interests in the Pittsburg district, and the determination of the United States Steel Corporation to introduce every possible economy into the manufacture of steel in that busy center, is again brought before the public notice by the formation of a company for the construction and operation of a canal for the carriage of iron ore direct from Lake Superior to Pittsburg. The cross section of the canal is to be sufficient for the accommodation of vessels of a displacement of 2,000 tons. The preliminary surveys, which are now under way, indicate that the length of the canal on the location which will probably be determined upon, will be about 110 miles. The indications are that there will be no engineering problems encountered that are novel or untried.

The topography of the proposed route of the canal between the junction of the Allegheny and Monongahela and the Lakes, and the desirability of a water route between these points, directed attention to the problem as far back as Revolutionary times. Washington, himself an engineer, was alive to its importance and practicability, and the scheme for its construction was regarded by him favorably. Fifty years later, surveys were made by the Federal authorities and also by the State of Pennsylvania, and upon the basis of these a canal of modest dimensions, whose navigable depth was between four and five feet, was constructed, and gave useful service for a period of forty years.

Although the original canal proved remunerative as a carrier of common merchandise, the larger waterway that is now projected, while it will, of course, be available for general merchandise, is to be built for the special purpose of enabling the ore-carrying steamers which now have to stop at Conneaut, or other Lake ports, and transfer their cargoes to the railroad, to make the whole journey from Lake Superior to the Pittsburg blast furnaces direct. The saving by this all-water route will be two-fold. In the first place, the considerable cost of transshipment of the cargo from the hold of the vessel to the ore bins, or to the cars, will be saved; and in the second place, there will be a further considerable saving, due to the fact that the ore can be carried more cheaply by water than by rail. The construction of this canal would insure the permanent pre-eminence of the Pittsburg district as the leading center of the steel industry, by placing it in all respects on an even footing with the blast furnaces that are located on the Lakes; for the advantage of shorter haul of the raw materials enjoyed by the furnaces at Chicago and Cleveland would be offset by the proximity of the Pittsburg furnaces to the magnificent and abundant supplies of coke from the neighboring Connellsville district.

SAFETY ON THE SEA.

In the presence of the fearful loss of life in accidents on our railroads, it is with relief that we contemplate the ever-increasing safety of travel by sea. Year after year passes by, without any of the important passenger steamers that cross the Atlantic, or other oceans on which passenger travel is heavy, meeting with an accident that causes risk of life or limb to the passengers. This fact is the more remarkable when we remember that ocean travel has increased by leaps and bounds during the past decade; that not only are there more steamers following the lanes of travel, but that they are running at much higher speed. The mail steamers come and go with a regularity approaching that of the best railroad schedule, and it takes the very fiercest of Atlantic midwinter gales to interfere seriously with this punctuality. In seeking for the causes of this remarkable immunity from accidents, we have to look not at the natural, but at the human elements of the situation. Seas are as broad and tempestuous as ever; fogs as impenetrable as those that baffled the early navigators still brood over the surface of the deep; the sunken reef; the shifting sandbar; the variable current; and many another natural cause of marine disasters, still beset the path of the navigator. Therefore, it is to the triumphs of invention and the perfecting of human control and management that we must look for an explanation of the all but absolute security of steamship travel to-day. The secret of this security is to be found both in the structure of the ship itself, and in the marvelously ingenious devices which science and invention have placed at the service of the navigator to guide him in the more perilous phases of his duty. Without enumerating those elements of watertight subdivision, vast size, and better control, in the ship itself, or the wonderfully sensitive and refined apparatus at the command of the modern navigator, we need but refer to two of the very latest safeguards, in the form of wireless telegraphy and submarine signaling, to show that the present immunity from accidents is traceable to clearly recognized human causes.

The last-named invention is a close rival to the wireless telegraph in the great increase that it has made in the safety of travel on the sea. Testimony to its efficiency was recently given by an officer of the "Kaiser Wilhelm der Grosse," upon which the new equipment is carried. We have so frequently described the device in the columns of the Scientific American, that it is sufficient to say that at the lighthouse or lightship there is a bell upon which signals are sounded, and that upon the ship is carried a receiving device in the form of an iron tank attached to the inside of the plating below the waterline, from which wires are led to telephones in the chart room or on the bridge. One receiver is placed on each side of the ship, with separate wires from each, and by the use of telephones the officer is able to hear a bell that is being struck at a point many miles distant from the ship, and determine its direction. The officer of the "Kaiser Wilhelm der Grosse" states that on the last trip over, when the ship was four miles distant from the mouth of the River Weser, he plainly made out the signals conveyed from the lightship there. Furthermore, as the vessel neared Nantucket, and when she was about four miles distant from the lightship, he heard through the telephone the signal "66." This consists of six strokes of the bell, a pause and then six more strokes of the bell, which is the Nantucket lightship code signal. At about the same distance from Fire Island light and from Sandy Hook lightship, the respective signals were distinctly audible. The value of this device in preventing collision between approaching ships is evident; for it has this advantage over the foghorn, that the direction of the approaching vessel, whether from port or starboard, is determined at once by the fact that the sounds are audible to the port or starboard telephone.

NEW ELECTRIC RAILROADS.

Among the new electric railroads on the Continent which have been constructed or are now building may be mentioned the new electric line running between Amsterdam and Haarlem. This is one of the last electric roads to be installed, as it was only finished last October. Since then it has been running very successfully. The length of the electric railroad is some sixteen miles. It passes along the main roads for the most part. Current is brought into the motor cars by a trolley of the arc or bow form. The overhead wire for the trolley is carried upon cross wires which are stretched across the track between iron poles. Inside the city limits the track follows the general lines of tramway construction and employs a grooved rail, but between the two cities the railroad form of track is used, with Vignole rails weighing 70 pounds per yard. At last accounts there were 35 cars in use upon the line. The chassis of these cars is mounted on four axles. Two electric motors are used for each car. These motors have a capacity of 50 or 60 horse-power at the maximum output. At the top speed, the cars run at 40 miles an hour. To supply current for the electric line, the railroad company has built a large dynamo station at a point near the middle of the line. The station is equipped with a battery of six Lancashire boilers having 90 square yards heating surface each. The boilers are provided with superheating apparatus. There are three main groups of direct-coupled generating apparatus in the dynamo hall. Each of these groups is similar and consists of a Bellis three-cylinder engine of 460 horse-power, running at 370 revolutions per minute, connected on the same shaft with a Westinghouse compound dynamo of the railway type, furnishing 575 volts direct current for the trolley circuit. Among the roads which are soon to be built is the line from Cologne to Düsseldorf. Two of the leading German electrical firms, the Allgemeine Gesellschaft and the Siemen-Schuckert Company, are to furnish the outfit for this road, supposing that the authorities allow them the concession, which is very probable. These two cities are connected at present by the Cologne-Berlin railroad. The new electric line is to form an extension of the trolley roads which are now running in each of the cities, and the two systems will be joined to each other by the interurban line. In this way there will be no need of special stations, but passengers can take the cars anywhere in the city. It is proposed to run cars on the line between the two cities every ten minutes. In 1910 it is estimated that the combined population of Cologne and Düsseldorf will reach 770,000, according to the present rate of increase, and a heavy traffic is expected on the new road. As to the expense of installing the interurban line, this has been figured at $5,000,000. According to the most recent reports it appears that a syndicate has been formed at Brussels for constructing a direct line from that city to Berlin. It is to use electric locomotives of high power, and the trains are to cover the distance between the two cities in seven hours. This will require a speed which exceeds 90 miles an hour, and in order to run at such a high speed, the railroad must be built as nearly as possible in a straight line.

The forms of timber trusses of different kinds, arches and combinations of two or more systems, have been very numerous. A marked step toward bridge designs of the modern truss form was the lattice bridge patented by Towne in 1820, which became the prototype of the early iron lattice bridge. The next important step in the development of wooden bridges was made in 1840, when Howe patented his truss, which became very popular and the standard for wooden railroad bridges. In 1844, the Pratt truss was patented, which afterward became the favored type for iron bridges. Many other types of trusses were invented, which have since been discarded.