SCIENTIFIC AMERICAN

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THE NEW OCEAN STEAMERS ST. LOUIS AND ST. PAUL.

The necessity for the immediate encouragement for the building, by American citizens, of a fleet of ocean steamships, capable of the highest speed, and constructed with special reference to government naval service, in case of war, led the Congress of the United States, in 1892, to enact certain special laws upon the subject.

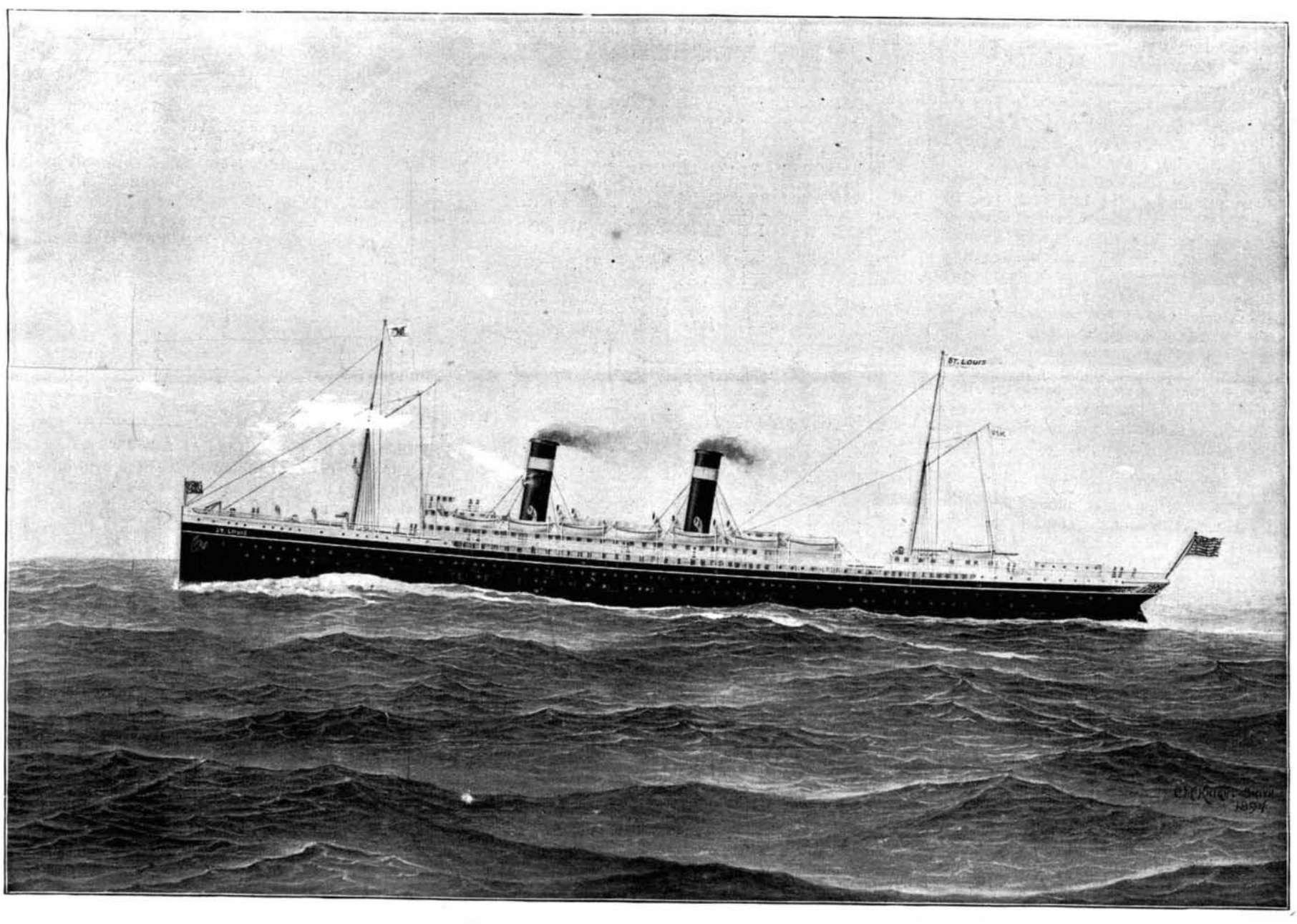
Authority was given to the International Navigation Company, of Philadelphia, at once to place under the American flag two of its fast English-built vessels, the New York and the Paris, provided others of equal or higher class should be promptly constructed in this country.

Thereupon the company entered into contracts with the Messrs. Cramp, of Philadelphia, for the construction of several new vessels, which are now under construction.

The first two of these, the St. Louis and the St. Paul, are now approaching completion. Herewith we present a drawing of one of these vessels, the St. Louis. The following particulars we derive from the *Steamship:*

The St. Louis and St. Paul are the first transatlantic passenger steamers to be built in the United States for a period of over twenty years, and they will be compared with the most recent productions of British shipbuilders, which represent the culmination of their skill and experience. They are the largest vessels ever constructed in America, their principal dimensions being: Length over all, 554 feet; length on load water line, 536 feet; extreme breadth, 63 feet; moulded depth, 42 feet; tonnage, gross register, 11,000 tons. The hull of each vessel is to have a double bottom constructed on the cellular principle, subdivided by athwartship bulkheads and a longitudinal division arranged for heeling purposes, the whole to be available for water ballast. In designing these vessels special attention has been given to the question of safety under all conditions. They are so subdivided by transverse bulkheads that even in the event of a collision and injury to a bulkhead, whereby two compartments might fill with water, the ship would still float in perfect safety. They will have a straight stem and elliptical stern, topgallant forecastle and poop, with close bulwarks fore and aft, two pole masts, and two lofty smoke pipes or funnels. There will be promenade, saloon, upper, main, and orlop decks, the three first-named to be plated from end to end. The main deck will be plated for the length of the machinery spaces, and will have stringers and tie plates beyond. Wood planking will be laid on all decks. The promenade deck will remain unbroken the whole length of the vessel. Arrangements have been made in each of the vessels for carrying about 320 first-class and 200 second-class passengers, and 900 emigrants. The first-class passengers will occupy the center of the vessel, the second-class will be between the stern and the center, and emigrants will occupy the ends of the vessel. The main saloon, which is large enough to seat all the first-class passengers at once, will be on the upper deck forward, and will be arranged with a large dome in the middle, so that the appearance of the interior will be that of an immense hotel dining hall. The second-class saloon will also be on the upper deck, but toward the after end, and will be fitted up in the ordinary style of a first-class saloon on an Atlantic liner. The first-class smoking room will be on the promenade deck aft, and will be furnished with everything that experience has taught contributes to the comfort of the passengers. Besides these there will be a library and drawing room, where the ladies and non-smokers may amuse themselves.

The engines of the new steamers will be the most powerful quadruple expansion marine engines in the world. They will probably develop about 10,000 I.HP. each. The cylinders will be 36, 50, 71 and 100 inches respectively in diameter, with a piston stroke of 60 inches, two sets of engines being placed in each boat to turn the twin screws, which will be sectional with three blades. Steam for the working of the main engines will be furnished at about 200 pounds pressure by six steel double-ended boilers, each 20 feet long and 15 feet 7½ inches diameter; the battery to have 48 Purves furnaces 39 inches diameter, and to be fitted with Serve's patent tubes. The total grate surface will aggregate about 830 square feet and the heating surface about 30,000 square feet. Piston valves will be fitted throughout and operated in the usual manner. The crank shafts, eccentric straps and connecting rods will be of forged steel, and the piston rods will be of ingot steel. The valve gear will be of the link type, controlled by a steam cylinder and also by an auxiliary hand gear. Many features will be added to insure the perfect working of these engines. The columns will be of cast steel forked at bottom. The thrust blocks will be of the usual horseshoe type, and the thrust shafts are to be about 13 feet long. The line shafting will be of forged steel, the bearings being of cast iron. The air pumps will be attached, but the condensers will be independent. To support the outboard shaft bearings, the hull is built out in a horizontal web to a steel frame, having both bosses cast in one piece, and weighing about 68,000 pounds. The after deadwood is cut away, and the keel slopes up, so that the shoe meets the boss frame at the after end. To comply with the terms of the contract, the builders will have to show, by an extended sea trial, that when working under ordinary sea-going conditions the vessels are to be easily capable of maintaining a speed of 20 knots



THE NEW AMERICAN ATLANTIC LINER ST LOUIS.

per hour at sea. Of course, the quadruple expansion engines of these twin screw vessels will be the most interesting feature, on account of the great power they are expected to develop.

This is the first time an effort has been made to use quadruple expansion in engines of over 4,000 I. H. P., and in only one or two instances has it been applied to engines of that power. In speaking of the vessels, Mr. Charles H. Cramp, in a paper read before the American Society of Naval Architects and Marine Engineers, said: "I will not venture prediction as to their probable performance, but I will guarantee them to be perfectly safe, comfortable and economical ships. They are to be closely followed by other ships, which I will not now describe, except to say that they will not shrink from comparison or competition. The St. Louis and St. Paul have been especially arranged so as to be readily and quickly convertible into armed cruisers, carrying eight 6 inch 100 pound rapid-fire guns, and the conditions of the mail contract between the United States government and the International Navigation Company place at the disposal of the American navy these great ships, almost instantly convertible into commerce destroyers, averaging greater performance than the Columbia, which, with the three others that are about to follow as quickly as the plans can be completed, will practically re-enforce the United States navy by $21,000,000 worth of ships, and that not only without cost of building, but also without the expense of maintenance and commission in time of peace. In conclusion, allow me to say that these ships will be American from truck to keelson. No foreign materials enter into their construction. They are of American model and design, of American material, and are being built by American skill and muscle."

Effect of the Earthquake Shock in Constantinople.

Mr. W. S. M'Gregor, the engineer of the Imperial Ottoman Gas Work at Dolma-Baghtche, sends the following to the *Journal of Gas Lighting:*

"A very severe shock of earthquake was experienced in Constantinople on the 10th of July, at 20 minutes past 12 P. M. The first shock lasted about 40 seconds; and a second shock, less severe, was felt about 5 minutes afterward. Considerable damage was done to property, and a number of houses were thrown down; while fires of a serious character broke out in different parts of the city. But comparatively little loss of life took place. At the Imperial Gas Works, at Dolma-Baghtche, the water in the gasholder tanks suddenly overflowed; while in No. 1 holder (a two-lift telescopic holder of 320,000 cubic feet capacity) the water rose suddenly and overflowed the tank, and as suddenly subsided. As the holder was cupped scarcely a sheet in the second lift, it uncupped and cupped again with startling rapidity; the girders and tie rods meanwhile shaking violently, and appearing as if they would be wrenched away from the columns. The chimney stalk of the old works was badly cracked, and a portion of the top thrown down; but beycnd this, and the flooding of the inlet and outlet pipes of the different gas holders, no serious damage was done. Various ugly cracks about the buildings testify to the serious nature of the shock; and altogether, if possible, it is not an experience that one would care to undergo a second time."

Electric Mail Cars in Brooklyn, N. Y.

The Atlantic Avenue Railway Company has recently completed at its shops, Twenty-fourth Street near Fifth Avenue, an electric postal car designed by the company officials, assisted by the postal authorities of Brooklyn, patterned after the standard type of postal car used on steam railroad lines.

Only half of the car will be used for postal purposes, the other half being a smoking compartment. There are pigeonholes for distributing the mails, and hooks for holding the mail pouches open. Drop letter boxes are provided at each corner of this compartment.

The exterior of the car presents a very handsome appearance. It is painted white, like the United States mail cars which are run on steam routes, the smoking compartment being lettered "Smoking Car." The windows are covered with wire screens. The car is mounted on a Brownell truck.

Two of these cars will go into service immediately.

An Improved Alloy.

Fifty parts of copper, forty parts of zinc, and aluminum in the proportion of two and a half per cent of the whole are taken. This is one example, but others may be obtained by varying the amounts of copper and zinc to the same proportion of aluminum.

The mode of preparation of the alloy varies: For a hard metal, the copper and aluminum are first mixed to form a copper alloy and the zinc added in small pieces during continuous agitation of the molten mass.

This gives a reddish alloy that takes a high polish. For a ductile metal the zinc and aluminum are first mixed and the copper then added. This gives an alloy resembling brass. In both cases the metal is claimed to be non-oxidizable, proof against sea water, and, to a large extent, against acids.—*D. W. Sugg, London.*

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(Illustrated articles are marked with an asterisk.)

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THE BROOKLYN MEETING OF THE AMERICAN ASSOCIATION.

As an especial degree of interest belongs to the buildings in whose halls the American Association for the Advancement of Science is to meet next week, a brief description of them may interest the public. The opening general session and the opening sessions of the sections will be held in the Polytechnic Institute of Brooklyn, located on Livingston Street. The building is very ample and of modern construction, fully equipped for the scientific instruction of the thousand or more undergraduates who are pursuing the several courses required for the degrees of Bachelor of Science, Bachelor of Arts, or Civil Engineer, or Electrical Engineer. Alongside this main building is the Preparatory Department, which has about eight hundred pupils in attendance. This institute, indeed, was originally founded, in 1854, as an academy; but its curriculum has been steadily enlarged and extended to meet the increasing demands of a growing city, and larger buildings were required for the accommodation of the increasing number of students. Accordingly, in 1889–90, the Regents of the New York University granted an absolute charter for the Polytechnic Institute, as it now exists, with a munificent endowment and a superior faculty ready for all the higher educational work found in similar institutions elsewhere. While mathematics, the ancient and modern languages, history, philosophy, etc., receive due attention, especial facilities are afforded for the study of chemistry, electricity, engineering, architecture, the steam engine, and the natural sciences in general. The Spicer Library contains 3,000 volumes classified for special investigation and research. The gymnasium is remarkably well equipped, and the laboratories, observatory, art studio and museum of natural sciences are equal to the needs of this admirable institution. And all these rooms and their contents are for the time at the disposal of the A. A. A. S. by the generosity of the corporation.

The Packer Institute is located on the corner of Livingstone and Joralemon Streets, in ample grounds, with spacious lecture rooms, fine laboratories, libraries and scientific collections. This college is for young ladies, of whom nearly 1,000 are in attendance during term time. Its graduates enter the senior year of such colleges as Smith and Vassar. The building being near that of the Polytechnic Institute, some of the sections will be assigned to rooms here.

The evening addresses, receptions and closing session will be held in the Academy of Music and Art building, Montague Street. All these buildings are near each other and are within a block of the City Hall Square.

THE WASTE OF COAL MINES AS A SOURCE OF POWER.

The readers of our columns have been kept informed of the work in progress at Niagara Falls for the utilization of some of the power now running to waste over the great precipice. Recently the project has been attacked by our contemporary, *Electricity*, and the assertion has been made that there is little chance of its paying for some time to come, and that it has a dangerous rival in the culm heaps of the Pennsylvania coal regions. Every coal mine in the anthracite region produces enormous quantities of coal dust, known as culm, which keeps on accumulating, as it has accumulated for many years, about the mines and coal breakers. This culm has good, calorific value, and recently manufacturers have begun to use it under their boilers. It can be bought for twenty-five cents a ton. Mr. D. B. Atherton, the secretary of the Scranton Board of Trade, has given figures to show that with culm firing a horse power per annum will cost but $3.93. At Niagara Falls a horse power will cost, it is said, $15 per annum. It is evident that the culm bank is the cheaper.

Of course this apparent difference is offset by other considerations. No account is taken of the capitalization of the steam and electric plants required to utilize culm, but the difference in the quotations given is so great as to certainly give the economic advantage to culm as a source of energy. In utilizing culm we are disposing of a waste product and of an accumulation of man's operations. In burning coal we are disposing of the accumulation of Nature's riches. Natural gas is already on the wane, and sooner or later coal will become exhausted. Then will be the time for Niagara Falls and similar natural sources of power to do their part in the work of the world. But to day there is at least a suspicion that the heavy capitalization of the Niagara Falls works will restrict greatly its domain of usefulness.

Another point made is that the anthracite regions are more favorably situated for the distribution of power than are Niagara Falls. On the whole, a very strong plea has been made for the culm bank as opposed to the great cataract.

Repeatedly in modern industries the question of capitalization has determined the success or failure of enterprises. At Niagara Falls the power primarily costs nothing; the capitalization and harnessing of the force of the cataract constitute the elements of cost.